RLH Industries, Inc.

iMux Fiber Optic Multiplexer System

User Guide

U-050 02014A-0911

RLH Industries, Inc.
Copyright © 2013 RLH Industries, Inc. All rights reserved.
No part of this document may be copied or distributed without permission.

The RLH logo may not be used for commercial purposes without the prior written consent of RLH and may constitute trademark infringement.

Other company and product names mentioned herein are trademarks of their respective companies. Mention of third-party products is for informational purposes only and constitutes neither an endorsement nor a recommendation. RLH assumes no responsibility with regard to the performance or use of these products.

The information contained in this document is the property of RLH Industries, Inc. and may not be reproduced or disseminated to third parties without the express written permission of RLH.

Every effort has been made to ensure that the information in this manual is accurate. RLH is not responsible for printing or clerical errors. Because we are constantly seeking ways to improve our products, specifications and information contained in this document are subject to change without notice.

RLH Industries, Inc.
936 North Main Street
Orange,CA 92867

Ph. 714 532-1672
email: info@fiberopticlink.com
www.fiberopticlink.com

Contents

1. Important Information

Intended Audience 8
Conventions 8
General Safety Practices 8

2. Introduction

Product Description 9
Standard Features 9
Application Diagrams 10
Front Panel 11
Front Panel LEDs 11
Module Status LEDs 12
LAN/MGMT Port LEDs 12
Optical Module LEDs 12
Rear Panel 13
4 Channel E1 Module 13
4 Channel T1 Module 13
4 Channel RS-232 Module 14
4 Channel V.35 Module 14
4 Channel Analog Phone (POTS) Modules 15
4 Channel 2/4 Wire Analog Data/Audio/SCADA Module 16
4 Channel 2/4 Wire Analog Data/Audio/SCADA/E&M Module 16
Setting E&M Jumpers and Switches 17
Acronyms 19

3. Before Installing

Observe Special Handling Requirements 20
Be careful when handling electronic components 20
Guidelines for handling terminated fiber cable 20
Prepare for Installation 21
Check for shipping damage 21
Verify system contents 21
Verify matching optical module and fiber modes 21

Site Requirements **21**
Site selection 21
Typical application environments 22
Required power sources 22
Test Equipment **22**
For T1 service 22
For analog phone service (POTS) 22
For RS-232 service 22

4. Quick Start

Easy Installation **23**
Before starting 23
Install the iMux 23
Connect power 23
Connect fiber cables 23
Connect ethernet cables 24
Connect data/phone equipment 24
Start the system 24

5. Configuring the System

Management Interface **25**
Using the VT-100 port 25
Select a Startup Profile 25
Main Menu **28**
System Configuration **29**
System Information Configuration **30**
Device Networking Configuration **31**
Setting the device IP 31
User Account Management **32**
Setting System Access Groups 32
SNMP Agent Configuration **33**
Setting the Trap IP 34
Software Upgrade Configuration **34**
Remote Server 34
Local File 35
Software Upgrade and Reboot Operation **36**
Upgrade Status 36
Upgrade Error Messages 37
Software Reboot Status 37
Network Time Synchronization **39**

Scheduling Job Management **40**
Networking Service Management **41**
Network TroubleShooting Operation **42**
LCD Login Configuration **44**
Event Management **45**
Event Class Processing Configuration 46
Event Alarm Processing Configuration 47
System Profile Management **48**
Configuration File Management **50**
Terminal File Transfer Operation **54**
Tributary Slot Interface Selection **55**
E1 Interface Configuration 56
V.35 Interface Configuration 58
FXO/FXS Interface Configuration 60
T1 Interface Configuration 61
Tributary TSA configuration 62
Normal mode (All E1 channels) 63
Seven E1 channels and one V.35 channel mode 64
Four E1 channels and one V.35 channel mode 65
Eight E1 channels and one V.35 channel mode 66
Optical Interface Parameters Configuration **67**
Trunk Ethernet Configuration Selection **69**
Trunk Ethernet General Parameter Config 70
Trunk Ethernet Parameters Config 71
Trunk Ethernet Port Rate Configuration 72
Trunk Ethernet Port VLAN Config 73
Trunk Ethernet VLAN Table Config Management 74
Trunk Ethernet QoS Port Config 75
Trunk Ethernet QoS Schedule Config 76
Trunk Ethernet QoS Tag Priority Config 77
Trunk Ethernet Tag Mark/Remark Config 77
Data Port Parameters Configuration **78**
Performance Management Threshold Configuration **79**
PM Threshold Configuration 79
Dsx1 Interface Threshold Setting 80
Aggregate Interface Threshold Setting 82
Fault Management Parameters Configuration **83**
Fault Parameter Configuration 83
Alarm Severity Config 84
Power Failure Monitoring Parameter Config 85

External Clock Configuration and Monitoring **86**
External Clock Configuration 86
External Clock Monitoring 87
OE Protection Switching **88**
Automatic laser shutdown 89
Equipment Status Monitoring **90**
Status Monitoring Screen 90
Local site tributary card setting 91
Remote site tributary card setting: 92
Performance Monitoring **93**
Aggregate/Dsx1 Performance Monitoring 93
Performance Monitoring Settings 94
Trunk Ethernet Performance Monitoring 95
Path Alarm/State Monitoring **96**
Interface Alarms 96
Loopback/V.54 Testing **97**
E1 Module 97
V.35 Module 98
PRBS Test **100**
One way PRBS test step 101
Event Browsing **103**

6. Front Panel Operation

Front LCD controls **104**
LCD Menu Tree **105**

7. Web Operating Interface

Using the web interface **109**
Saving or loading profiles **111**

8. Telnet Operating Interface

SNMP management **112**

9. Appendix

Craft & External Alarm Ports Pin Assignment **113**
External clock port 113
Craft port (VT100) 113
Alarm port 113
External alarm port 114

10. Troubleshooting

First Step: Isolate the problem **114**
Common Issues **114**
Power supply issues **115**
AC power 115
Verifying fiber cable **115**
Module installation **115**
Troubleshooting Guide **116**

11. Specifications

General Specifications **118**
Optical Module Specifications **118**
Service Module Specifications **119**

12. Ordering Information

Base Systems **120**
Port Modules **120**
Optical Modules **121**

13. Support

Technical Support **122**
Contact Information **122**

1. Important Information

Intended Audience

This manual is intended for use by knowledgeable telco/network installation, operation and repair personnel. Every effort has been made to ensure the accuracy of the information in this manual is accurate. However, due to constant product improvement, specifications and information contained in this document are subject to change without notice. Please refer to the iMux User Guide for additional information.

Conventions

Symbols for notes, attention, and caution are used throughout this manual to provide readers with additional information, advice when special attention is needed, and caution to prevent injury or equipment damage.

Notes: Helpful information to assist in installation or operation.

Attention: information essential to installation or operation.

Caution: Important information that may result in equipment damage or injury if ignored.

General Safety Practices

The equipment discussed in this manual may require tools designed for the purpose being described. RLH recommends that installation and service personnel be familiar with the correct handling and use of any equipment used, and follow all safety precautions including the use of protective personal equipment as required.

Caution - Severe Shock Hazard

- Never install during a lightning storm or where unsafe high voltages are present.
- Active T1 lines carry high DC voltages up to 56V. Use caution when handling T1 wiring.

Laser Safety

- Radiation emitted by laser devices is dangerous to to human eyes.
- Avoid eye exposure to direct or indirect radiation.
- Do not operate without fiber cable attached or dust caps installed.

2. Introduction

Product Description

The iMux is a powerful fiber optic modular multiplexer capable of providing up to 16 channels of T1, RS232, 2/4 wire data and analog phone FXO/FXS services, plus four built-in 10/100M Ethernet ports, over a single fiber.

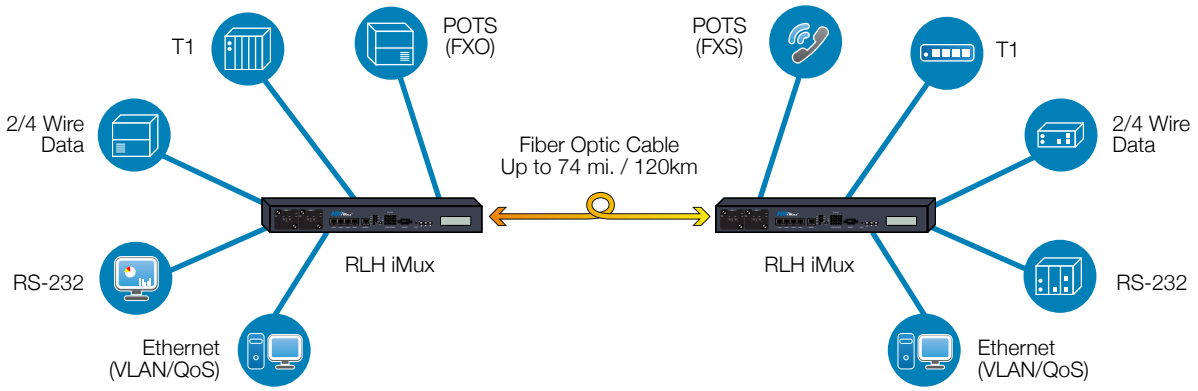
These services are supplied by the modules, up to four, that each offer four lines of communication and may be installed in any combination. Spares or add-on modules may be ordered separately and are field installable. The optical modules are available in both dual fiber and single bi-directional fiber (WDM), and up to 2 optical modules may be installed, providing 1+1 hot-swappable optical protection and making the best use of fiber availability.

The iMux may be managed through SNMP, web Interface, craft port or LCD/menu keys on the front panel. It also has an external alarm port for alarm input monitoring, as well as 4 programmable alarm contacts. The system provides local/remote loopback functions that are ideal for network testing and maintenance. The iMux takes up 1RU and comes complete with EIA19" and 23" rack ears, or it may be used on a desktop or shelf.

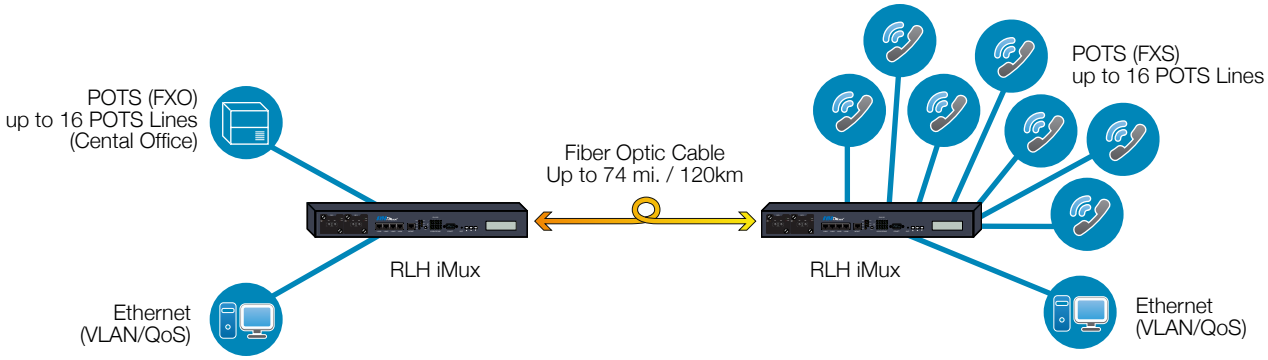
Standard Features

- Multiplexes up to 16 voice and data channels plus Ethernet over a single fiber
- Up to 4 modules (each with 4 lines) may be used in any combination to mix and match services
- Convenient front LED status indicators
- T1, RS232, POTS, & 2/4 wire Data service modules
- 4 built-in 10/100 Ethernet ports
- Aggregated Ethernet throughput up to 100Mbps
- Optical module auto laser shutdown (ALS), hot swappable 1+1 protection
- Alarm relay has major and minor alarms (audible and visible alarm output)
- Supports SNMP , HTTP / FTP / TFTP remote software upgradeable
- Supports TELNET function to configure and monitor local and remote devices through TCP/IP network
- Available with ringdown circuit operation
- Redundant 48VDC or AC/DC powering options

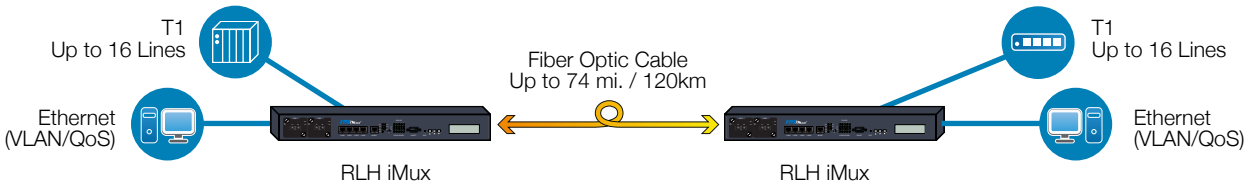
Application Diagrams



Multiple Service Example

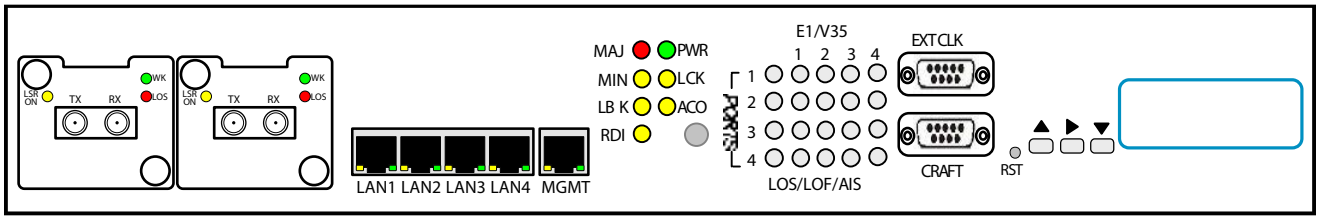


16 Channels of POTS Example



16 Channels of T1 Example

Front Panel

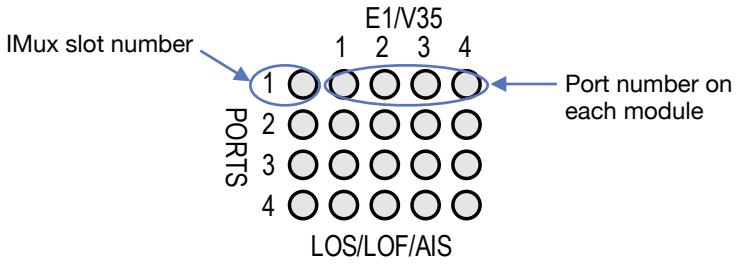


Front Panel LEDs

LED	Color	Name	ON condition	OFF condition
MAJ	RED	Major Alarm	Major alarm event is present and being signaled through rear panel alarm connector.	Normal operation
MIN	YEL	Minor Alarm	Minor alarm event is present and being signaled through rear panel alarm connector.	Normal operation
LBK	YEL	Loopback	E1 loopback signal received	Normal operation
RDI	YEL	Remote Defect Indication	Indicates a failure in the remote terminal.	Normal operation
PWR	GRN	Power	iMux is powered and ON	iMux is powered OFF, or no power is present
LCK	YEL	Optical Link Lock	The optical link is locked because it has switched to protect line mode.	Normal operation
ACO	YEL	Alarm Cut Off	Normal operation	ACO Button has been pressed. See note below.

Note: ACO Button and LED operation.
The ACO button mutes the audible alarm when a problem occurs. When the button is pressed the ACO LED illuminates. If any newer alarm is reposted after the ACP button has been pressed, the external alarm will activate again

Module Status LEDs



LED	Name	Color	Condition
PORT	Installed port slot	RED	No module is installed at this port number
		GRN	A module is installed at this port number
E1/V35	Module port status for any installed module	RED	No connection is detected to that port
		GRN	Active connection is attached to that module port

Note: Although the port status LEDs are labeled E1/V35, they will display the status of any module installed except the analog phone (POTS) modules. The phone module does not display connections made to each port on the module and the LEDs for those modules only will be GRN when off-hook and RED when ringing.

LAN/MGMT Port LEDs

LED	Name	Color	ON condition	OFF condition
LAN 1 ~ LAN 4	LAN port activity	YEL	Data is being received	No data is being received
		GRN	Data is being sent	No data is being sent
MGMT	SNMP management port activity	YEL	Data is being received	No data is being received
		GRN	Data is being sent	No data is being sent

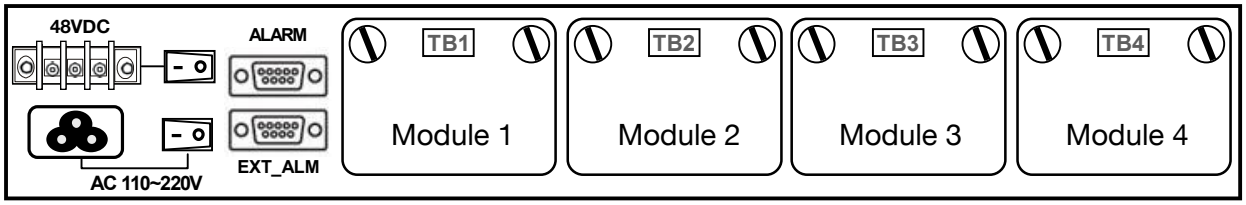
Optical Module LEDs

LED	Name	Color	ON condition	OFF condition
LSR	Laser	YEL	Laser condition is OK	Laser not operating
WK	Working	GRN	Activity over fiber	No activity over fiber
LOS	Loss of Signal	RED	Loss of fiber signal	Normal operation

Rear Panel

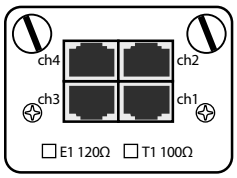
Any of the modules may be plugged into any position, called a Tributary Slot. These are referred to as TB1~TB4.

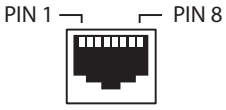
Refer to the Specifications section for additional information.



4 Channel E1 Module

Four RJ-45 connectors for input/output of 4 channels E1 signal at 120Ω.

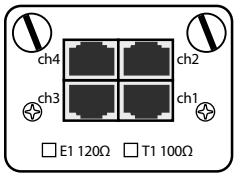


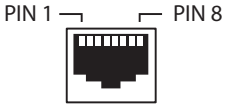


Pin	Name	Description
1	Rx Ring	
2	Rx Tip	Input to E1 Card
3	NC	
4	Tx Ring	
5	Tx Tip	Output from E1 Card
6	NC	
7	NC	
8	NC	

4 Channel T1 Module

Four RJ-45 connectors for input/output of 4 channels T1 signal at 100Ω.

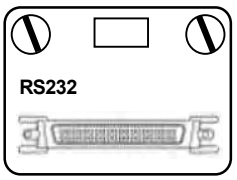


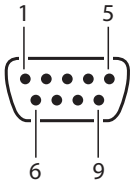


Pin	Name	Description
1	Rx Ring	
2	Rx Tip	Input to T1 Card
3	NC	
4	Tx Ring	
5	Tx Tip	Output from T1 Card
6	NC	
7	NC	
8	NC	

4 Channel RS-232 Module

4xRS-232 module, HD68 to 4 DB-9 connectors to RS-232 interface. Breakout adapter cable is included.

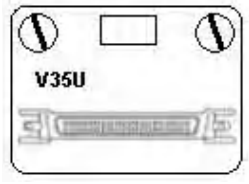


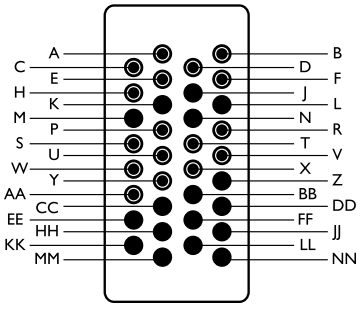


DB-9 Female DCE		
Pin	**Description**	**I/O**
1	DCD	Output
2	TXD	Output
3	RXD	Input
4	DTR	Output
5	SG	GND
6	DSR	Input
7	RTS	Output
8	CTS	Input
9	RI	Output

4 Channel V.35 Module

4xV35 module, HD68 to 4 M34 connectors to V.35 interface. Breakout adapter cable is included.

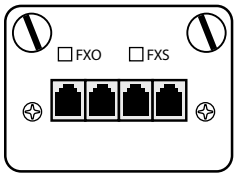


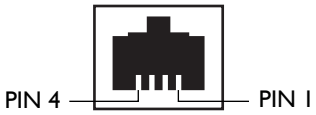


M/34 Female DCE					
Pin	**Signal**	**Description**	**Pin**	**Signal**	**Description**
A	Chassis Ground	-	V	Receive Timing A	Out
B	Signal Ground	-	W	Terminal Timing B	In
C	Request to Send	In	X	Receive Timing B	Out
D	Clear to Send	Out	Y	Send Timing A	Out
E	Data Set Ready	Out	Z	N/A	-
F	Data Carrier Detect	Out	AA	Send Timing B	Out
H	Data Terminal Ready	In	BB	N/A	-
J	Local Loop Back	Out	CC	N/A	-
K	Local Test	In	DD	N/A	-
L	N/A	-	EE	N/A	-
M	N/A	-	FF	N/A	-
N	N/A	-	HH	N/A	-
P	Send Data A	In	JJ	N/A	-
R	Receive Data A	Out	KK	N/A	-
S	Send Data B	In	LL	N/A	-
T	Receive Data B	Out	MM	N/A	-
U	Terminal Timing A	In	NN	N/A	-

4 Channel Analog Phone (POTS) Modules

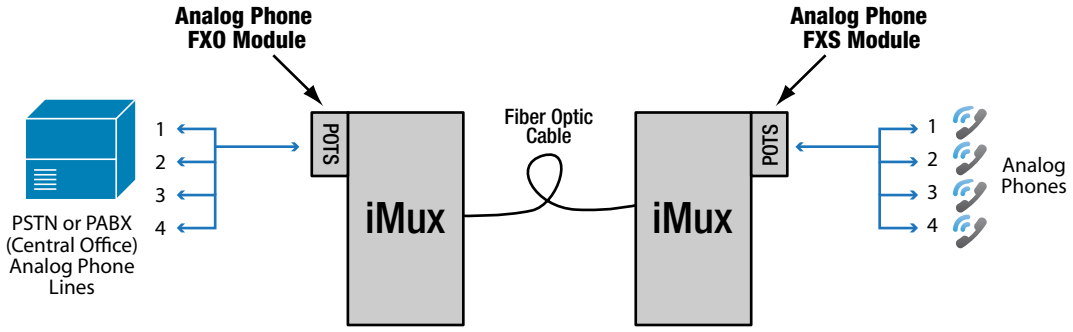
Analog phone uses RJ-11 connectors and are supplied as FXS/Sub side and FXO/CO side modules. The FXO/CO module is connected to a central office or PBX, and the FXS/Sub module is connected to the customer telephone. Each line number FXO raises the same line number FXS, and provides 64k voice bandwidth. Use an FXS module on each end for ringdown operation where connection to phones on both ends of the system is desired.



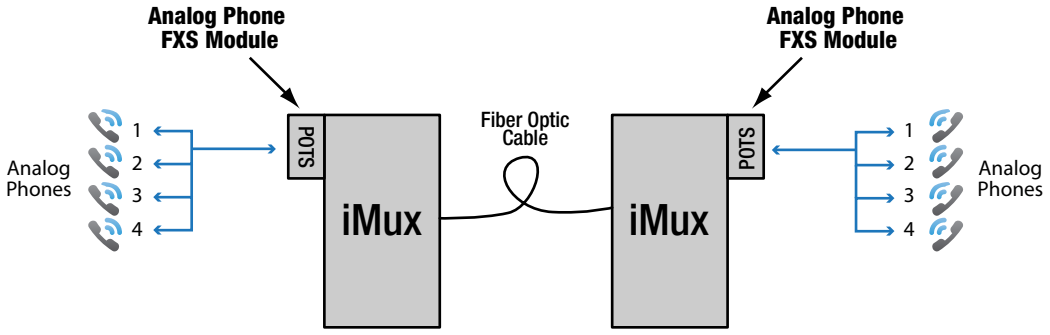


4 PIN RJ-11 Female

Analog Channel	Pin	Description
Analog Voice	3	Tip
	2	Ring



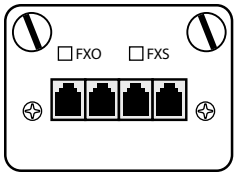
4 Channel Analog Phone Module Connection Diagram

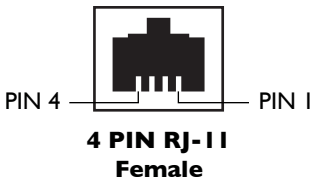


4 Channel Analog Phone Module Ringdown Connection Diagram

4 Channel 2/4 Wire Analog Data/Audio/SCADA Module

Four Analog 2/4 Wire Data/Audio/SCADA modules use RJ-11 connectors.
Each channel has 300Hz ~ 3.4kHz bandwidth.





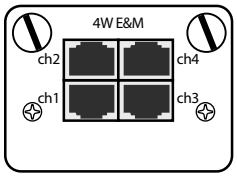
4 PIN RJ-11
Female

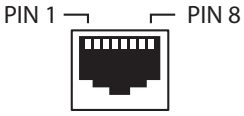
Analog Channel	Pin	Description
Input	1	Tip
	4	Ring
Output	2	Tip
	3	Ring

4 Channel 2/4 Wire Analog Data/Audio/SCADA/E&M Module

Four Analog 2/4 Wire Data/Audio/SCADA/E&M modules use RJ-45 connectors.
Each channel has 300Hz ~ 3.4kHz bandwidth. E&M type is set in software.

Master and Slave settings are set using the jumper and DIP switches on the module itself. Refer to the following pages.





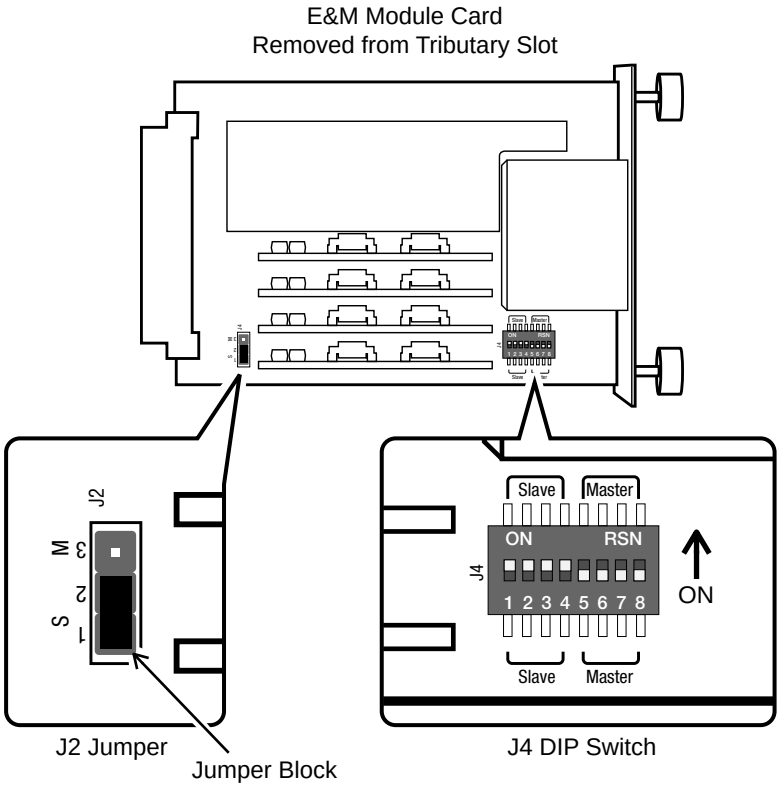
Pin	Name	Description
1	NC	NC
2	Rx Tip	Input
3	Rx Ring	Input
4	Tx Ring	Output
5	Tx Tip	Output
6	M	M Lead
7	E	E Lead
8	GND	Signal Ground

Refer to the sample E&M setting and application diagrams on the following pages.

Setting E&M Jumpers and Switches

Use the J2 jumper and the J4 DIP switches to set the E&M module mode to Master or Slave depending on the placement of the iMux in the network. The diagram on the following pages will help you determine the correct settings for your application.

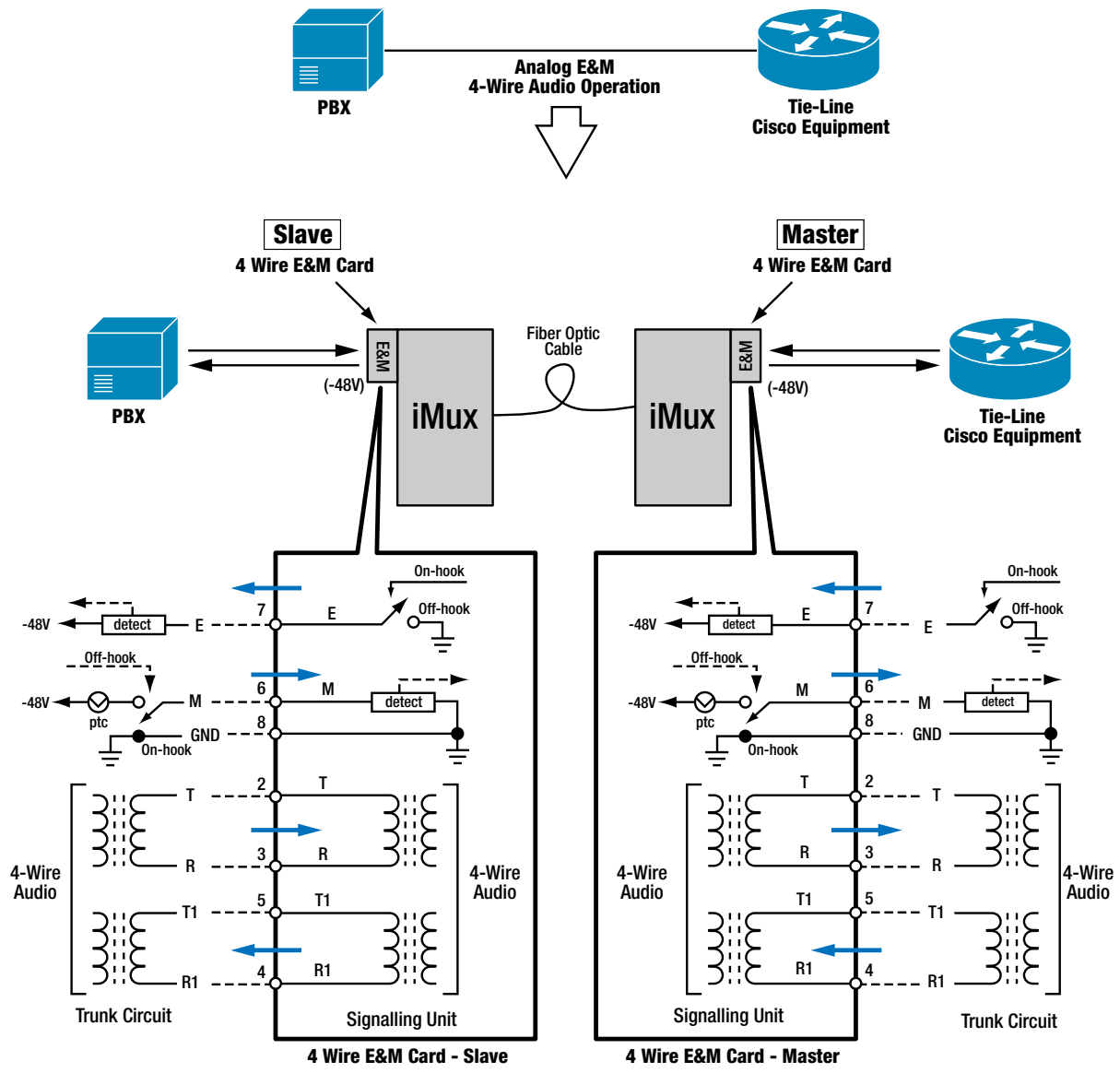
Refer to the diagram below for configuration settings.



Mode	J2 Jumper
Slave	Jumper Pins 1 & 2
Master	Jumper Pins 2 & 3

Mode	J4 DIP Switch Setting	
Slave	Switches 1~4 ON	Switches 5~8 OFF
Master	Switches 5~8 ON	Switches 1~4 OFF

E&M module Master and Slave settings



E&M Application Diagram

Acronyms

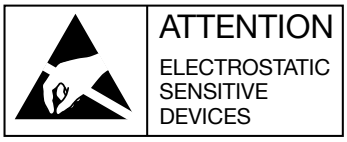
Commonly used acronyms and abbreviations

Acronym/Abbreviation	Description
B8ZS	Bipolar 8 Zero Substitution
FXO/CO	Central Office Side Equipment
FXS/Sub	Subscriber side equipment
LED	Light Emitting Diode
RX	Receive
TX	Transmit
RED	Red LED color
YEL	Yellow LED color
GRN	Green LED color

3. Before Installing

Observe Special Handling Requirements

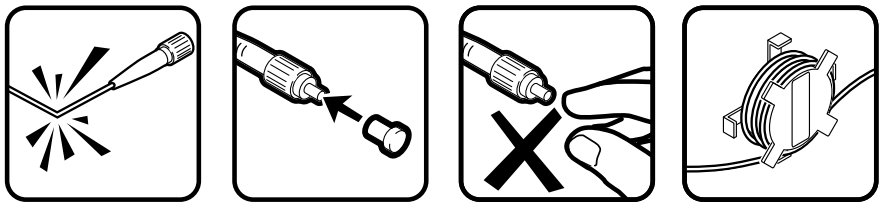
Be careful when handling electronic components



- This product contains static sensitive components.
- Handle the T1/E1 cards and optical modules by their faceplates only.
- Follow proper electrostatic discharge procedures.

This card utilizes circuitry that can be damaged by static electricity. When transporting the card, carry it in an ESD safe container such as the antistatic bag provided with the card. Before handling cards, discharge yourself of static electricity by physical bodily contact with earth ground. When handling cards, hold by outer edges and avoid touching circuitry. Failure to follow ESD precautions may cause serious damage to the card and prevent proper operation.

Guidelines for handling terminated fiber cable



- Do not bend fiber cable sharply. Use gradual and smooth bends to avoid damaging glass fiber.
- Keep dust caps on fiber optic connectors at all times when disconnected.
- Do not remove dust caps from unused fiber.
- Keep fiber ends and fiber connectors clean and free from dust, dirt and debris. Contamination will cause signal loss.
- Do not touch fiber ends.
- Store excess fiber on housing spools or fiber spools at site

Prepare for Installation

Check for shipping damage

Carefully unpack and inspect the unit and accessories. Contact RLH immediately if any components are damaged or missing. Electronic components, fiber optic cable, and accessories have special handling requirements to prevent damage and enhance system reliability.

If the iMux will be relocated in the future, save the cartons and protective packaging material.

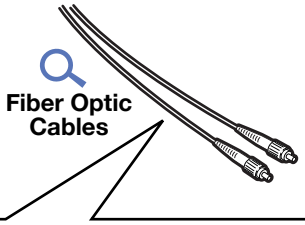
Verify system contents

The following items are shipped with your iMux system (as applicable)

- User manual CD and Quick Start Guide
- AC power converter and cord
- DB9 cable
- T1/RS-232 breakout adapter cables

Verify matching optical module and fiber modes

Fiber mode and optical module mode must be the same.



Fiber Type	Color	Identifier
Single Mode	Yellow	9/125µm
Multimode	Orange	50 /125µm, 62.5/125µm

Site Requirements

Site selection

Locate the iMux to allow easy access to the equipment. Leave at least 36 inches (90 cm) clearance in the front and at least 4 inches (10.2 cm) at the rear.

To avoid overheating, do not block the cooling fan. Leave at least 1 inch (2.5 cm) clearance on either side of iMux. Do not stack other equipment directly on top of the iMux when rack or shelf mounting.

Typical application environments

Install the fiber optic cable prior to installing the iMux system.

Required power sources

You will need an acceptable power source. The iMux system accepts 90 ~ 240VAC (47Hz ~ 63Hz) and 12, 24 or 48VDC (9 ~ 75VDC) depending on the model.

The F.C.C. requires telecommunication equipment to withstand electrical surge that may result from lighting strikes. This equipment has been tested and found to comply with the F.C.C. requirement. Users should follow the precautions below to insure the safety and minimize the risk of damage to the equipment

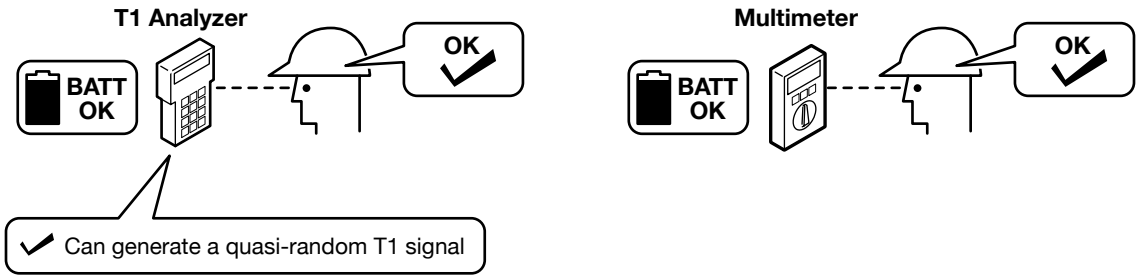
Make sure that the AC power outlet is properly grounded. Proper grounding should include a minimum of a grounded rod buried outside the building at least 8 feet (2.44 meters) deep.

Test Equipment

For T1 service

You will need a T1 analyzer such as a T-BERD.

Be familiar with the test settings. Some analyzers have line power and multimeter capability. For installation where no T-1 signal is available, the analyzer must be capable of generating a quasi-random T-1 signal.



For analog phone service (POTS)

You will need a working POTS line or an analog phone signal generator.

Be familiar with the test settings. Some analyzers have line power and multimeter capability. For installation where no T-1 signal is available, the analyzer must be capable of generating a quasi-random T-1 signal.

For RS-232 service

You will need a working RS-232 interface data connection.

4. Quick Start

Easy Installation

Before starting

- Review the safety information in section **1. Important Information**
- Familiarize yourself with the iMux and it's modules as described in section **2. Introduction**
- Know how to handle fiber optic cable, have a suitable installation environment with the correct power, and have the necessary test equipment as described in section **3. Before Installing**

Install the iMux

The iMux is pre-configured at the factory for your particular requirements, and will operate without any setup. For additional configuration instructions please refer to the iMux User Guide.

- Mount the iMux in a 19" equipment rack, on a shelf or table
- Make sure the power switches are OFF

Connect power

For AC Power units

Remove power from AC mains supply. Connect the AC power cord to the terminals on the iMux and plug into 110/240VAC, 50/60Hz mains outlet.

- Alternately, wire AC mains power directly from AC power source

For DC Power supply

- Check that DC power source voltage matches voltage range of DC power input.
- Remove power from the DC power source prior to connecting to the iMux.
- Connect the DC power cables to the iMux. Check the positive and negative polarity of the connection.
- Energize the power source.

Connect fiber cables

- The fiber cable(s) must be the right type of cable, with the correct connectors and suitable length.
- Attach the connector(s) carefully using care to avoid bending the fiber cable too sharply and damaging the fiber.
- Do not touch fiber connector ends which could cause contamination and lower signal performance.

Caution

Radiation emitted by laser devices is dangerous to to human eyes. Avoid eye exposure to direct or indirect radiation. Do not operate without fiber cable attached.

Connect ethernet cables

- Attach ethernet cables to the RJ-45 ethernet ports labeled LAN1 through LAN4 on the front panel of the iMux.

Connect data/phone equipment

Attach the breakout adapters and cables depending on your iMux module configuration.

Connect T1 cables

- Attach the breakout adapter cable to the DB-25 connector on the T1 module.
- Connect the RJ-45 T1 connectors to the breakout adapter cables.

Connect Analog Phone (POTS) FXO/FXS cables

- Attach the phone cables directly to the RJ-11 connectors on the analog phone module.

Attach RS-232 Data Cables

- Attach the breakout adapter cable to the connector on the RS-232 module.
- Connect the RS-232 data connectors to the DB-9 connectors on the breakout adapter cable.

Attach 2/4W Data/SCADA Cables

- Attach the data cables directly to the RJ-11 connectors on the analog phone module.

Refer to the iMux User Guide for pin out and port configuration information.

Start the system

Turn each iMux ON using the power switch on the rear panel. The system will initialize and start up. The LED indicators on the front panel will flash during initializing and stop flashing after setup is done. The iMux is now operational and may be configured as desired.

Refer to the iMux User Guide for additional configuration information.

5. Configuring the System

Management Interface

Using the VT-100 port

Any PC with an operating system that supports the VT-100 Craft Port can be used as a console. The following instructions utilize the VT-100 Craft Port on a PC running Windows 98/2000/NT.

1. Use the supplied RS-232 cable and connect the console port to the COM port of the console PC.
2. Use a telnet program such as Windows Hyper Terminal to perform the console management operations.
   Note: Other telnet client software such as NetTerm© may also be used, and may offer additional features such as function key support to help with setup.
3. VT-100 terminal settings:

Bit Rate	57600 bps
Data Bit	8 bits
Parity	No Parity
Stop Bit	1 Stop bit
Flow Control	None
Set the emulation mode to"VT-100" or "Auto Detect"	

Startup loading screen

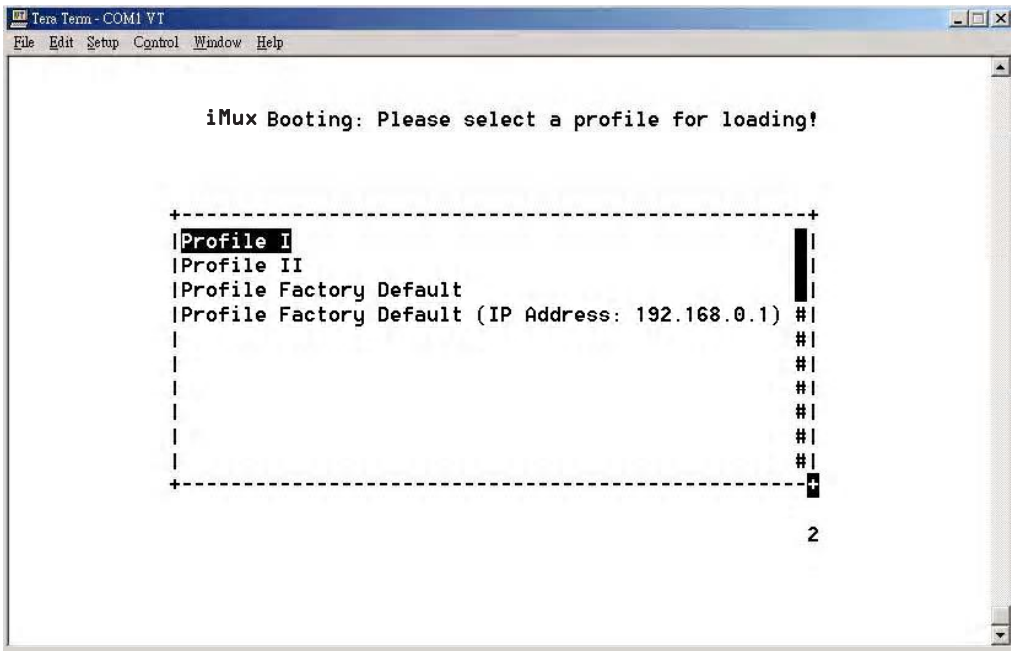
When first connecting to iMux, the loading screen will be displayed. The loading screen permits the user to start the iMux into a particular operating mode, or return to factory profiles.

Select a Startup Profile

There are four selectable profiles. The pre-configured factory settings has been created and saved in **Profile I** and **Profile II**. The default booting process will select Profile I.

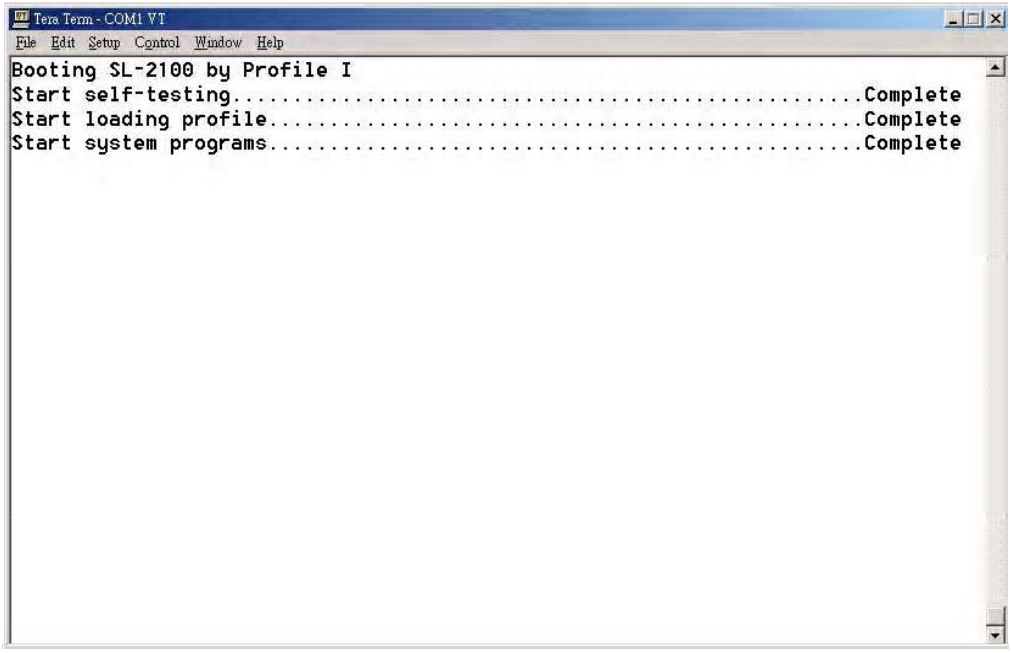
Profile Factory Default has all settings cleared, and an IP address of 0.0.0.0.

Profile factory default (IP Address: 192.168.0.1) is clear of all settings but retains the IP 192.168.0.1 address so that the user may simply connect and manage the iMux through the web interface (MGMT port) on the front panel.


Tera Term - COM1 VT
File Edit Setup Control Window Help
iMux Booting: Please select a profile for loading!
Profile I
Profile II
Profile Factory Default
Profile Factory Default (IP Address: 192.168.0.1)
2

Startup Loading Screen

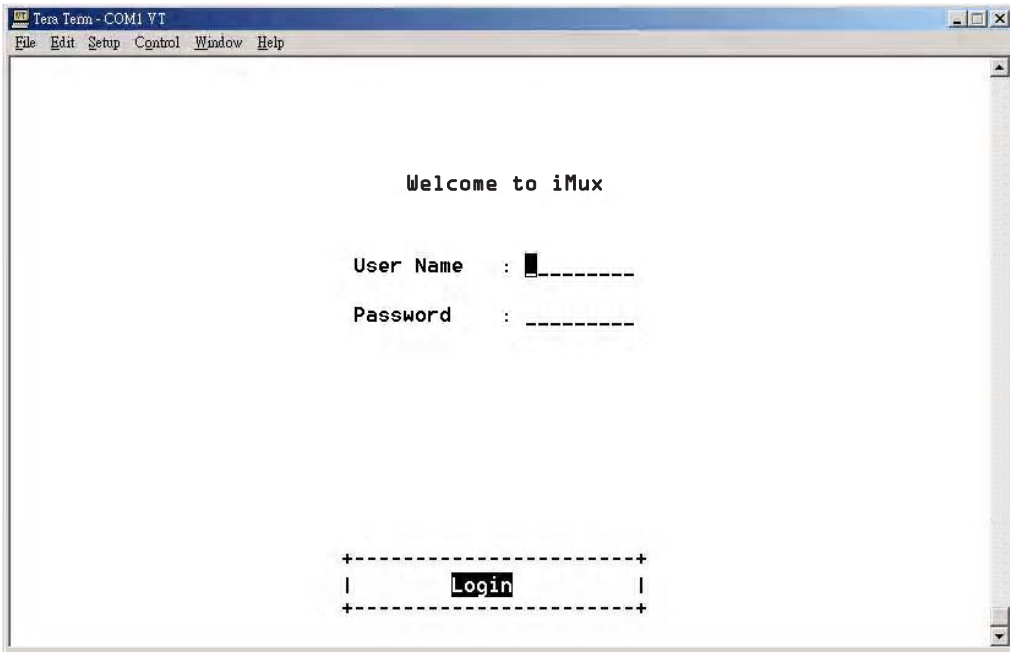
Once a mode has been selected, the system continues the startup procedure utilizing the built in self-diagnostic function during the boot procedure. The self-diagnostic function includes system memory access test, system main clock test and tributary card access test.


Tera Term - COM1 VT
File Edit Setup Control Window Help
Booting SL-2100 by Profile I
Start self-testing.....Complete
Start loading profile.....Complete
Start system programs.....Complete

Self-diagnostic Screen

After the system test is complete, the login screen appears. Unless previously changed, enter the default User Name and User Password.

- Default User Name: **admin**
- Default Password: **1234**

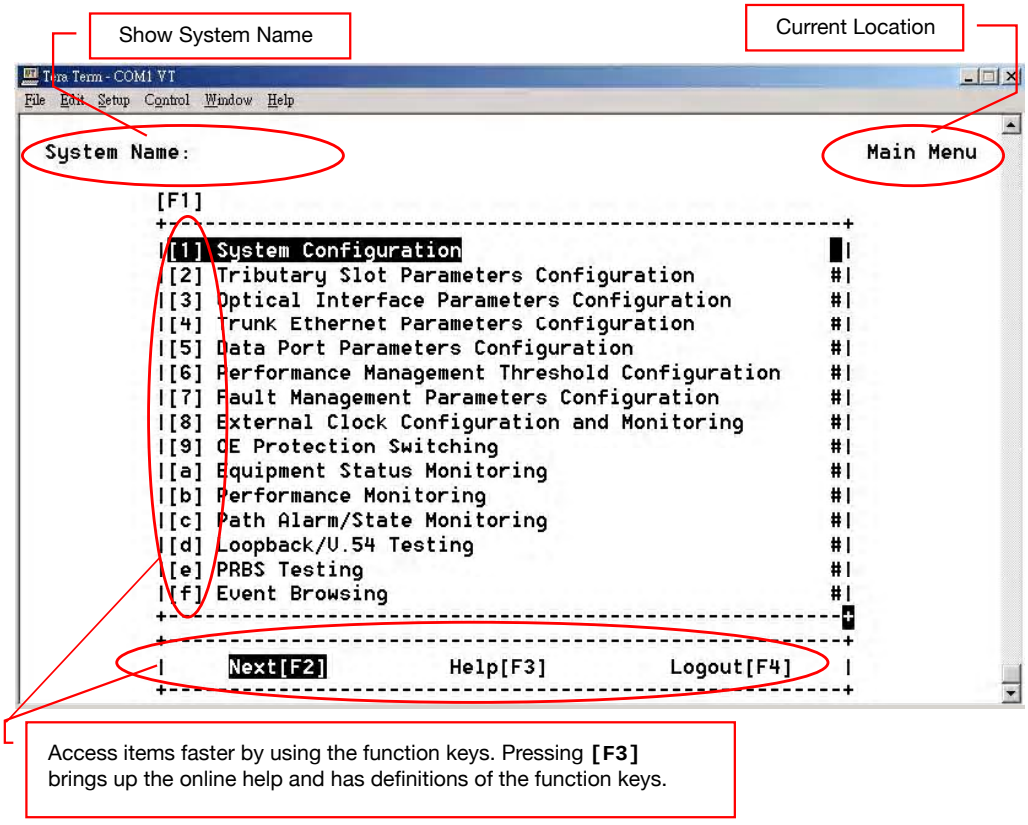


Login Screen

Once login information has been entered, the main menu screen appears.

Main Menu

Any changes that are made and saved will modify the current Startup Profile except for the Profile Factory Defaults.


Show System Name
Current Location
Tera Term - COM1 VT
File Edit Setup Control Window Help
System Name:
Main Menu
[F1]
[1] System Configuration
[2] Tributary Slot Parameters Configuration
[3] Optical Interface Parameters Configuration
[4] Trunk Ethernet Parameters Configuration
[5] Data Port Parameters Configuration
[6] Performance Management Threshold Configuration
[7] Fault Management Parameters Configuration
[8] External Clock Configuration and Monitoring
[9] OE Protection Switching
[a] Equipment Status Monitoring
[b] Performance Monitoring
[c] Path Alarm/State Monitoring
[d] Loopback/U.54 Testing
[e] PRBS Testing
[f] Event Browsing
Next[F2]
Help[F3]
Logout[F4]
Access items faster by using the function keys. Pressing [F3] brings up the online help and has definitions of the function keys.

Main Menu

After entering the main menu, the user may select any one of the nine configuration screens or six testing/ monitoring screens

Configuration Screens

1. System Configuration
2. Tributary Slot Parameters Configuration
3. Optical Interface Parameters Configuration
4. Trunk Ethernet Parameters Configuration
5. Data Port Parameters Configuration
6. Performance Management Threshold Configuration
7. Fault Management Parameters Configuration
8. External Clock Configuration and Monitoring
9. OE Protection Switching

Testing/Monitoring Screens

j. Equipment Status Monitoring

k. Performance Monitoring

l. Path Alarm/State Monitoring

m. Loopback/V.54 Testing

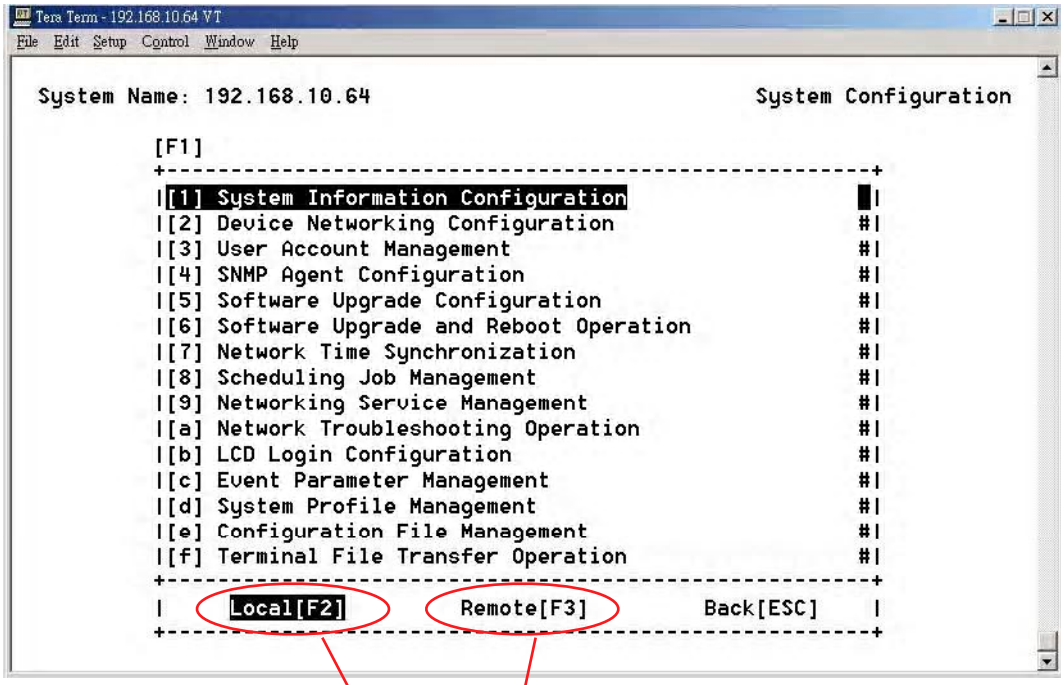
n. PRBS Testing

o. Event Browsing

System Configuration

Either the local or remote iMux units may be selected for configuring. Select the **`Local[F2]`** or **`Remote[F3]`** units by using the function keys prior to making any other menu selections.

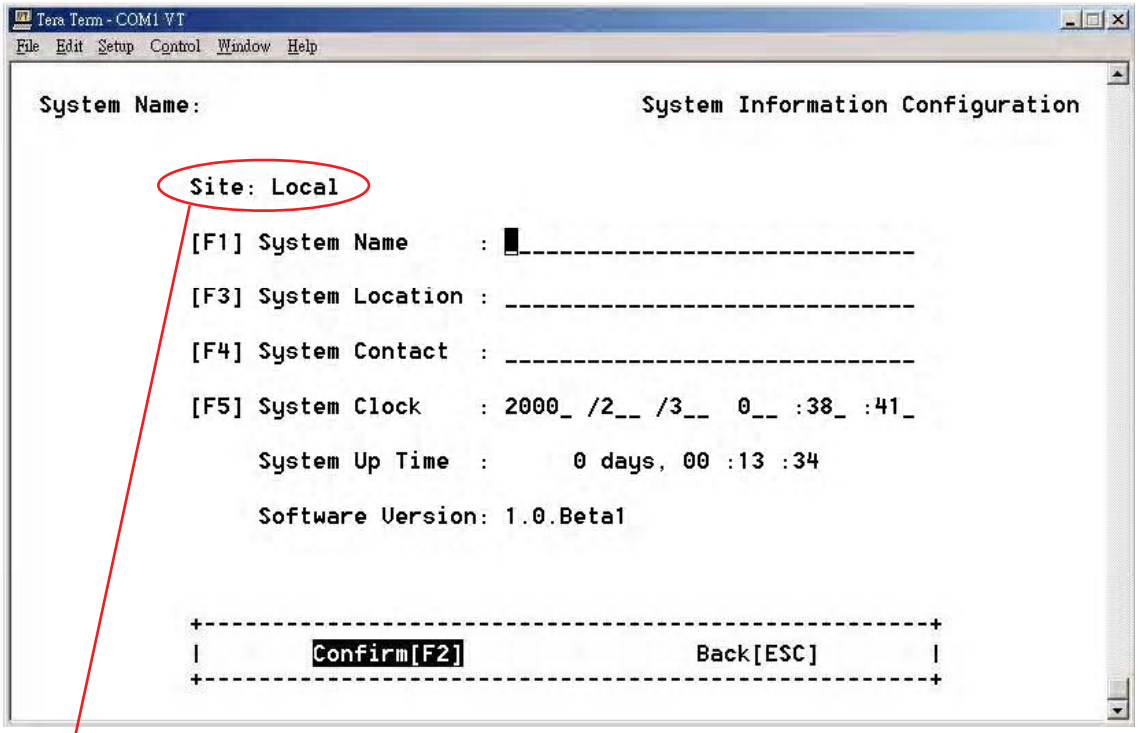
Each subsequent menu will display which unit (local or remote) you are changing settings on.


Tera Term - 192.168.10.64 VT
File Edit Setup Control Window Help
System Name: 192.168.10.64
System Configuration
[F1]
[1] System Information Configuration
[2] Device Networking Configuration
[3] User Account Management
[4] SNMP Agent Configuration
[5] Software Upgrade Configuration
[6] Software Upgrade and Reboot Operation
[7] Network Time Synchronization
[8] Scheduling Job Management
[9] Networking Service Management
[a] Network Troubleshooting Operation
[b] LCD Login Configuration
[c] Event Parameter Management
[d] System Profile Management
[e] Configuration File Management
[f] Terminal File Transfer Operation
Local[F2]
Remote[F3]
Back[ESC]
Choose either the local or remote unit for configuration before making changes.

System Configuration Screen

Use the **up** or **down** key to select any of the menu items, or press **`[F1]`** function key to go to that section, or **`[ESC]`** to return to the previous menu. Detail descriptions of each item will be covered in the following sections.

System Information Configuration


Tera Term - COM1 VT
File Edit Setup Control Window Help
System Name:
System Information Configuration
Site: Local
[F1] System Name : _____
[F3] System Location : _____
[F4] System Contact : _____
[F5] System Clock : 2000_ /2__ /3__ 0__ :38_ :41_
System Up Time : 0 days, 00 :13 :34
Software Version: 1.0.Beta1
Confirm[F2]
Back[ESC]

Note: This shows the local or remote device you are configuring.

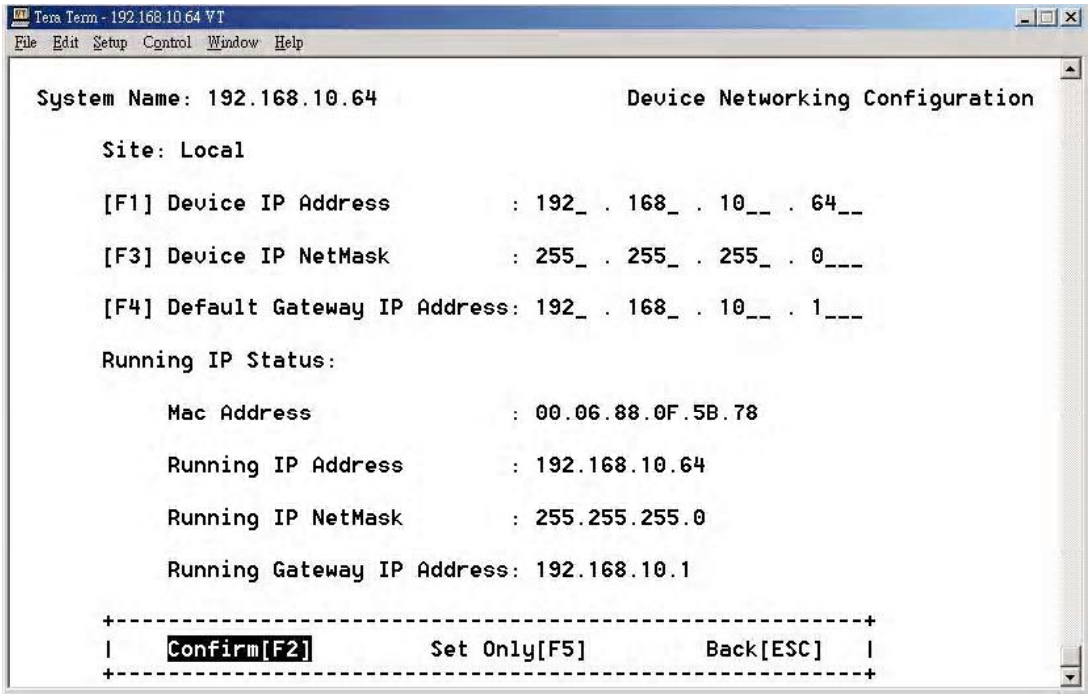
System Information Configuration Screen

The system administrator can enter the system name the location of the system, and the contact person. Entries must be 256 characters or less.

Set the system clock by entering the correct time. This screen shows the running time of the system and the software version.

After making any changes, press **`Confirm[F2]`** to save them. Returning to the System Configuration menu by pressing **`Back[ESC]`** without saving first will discard any changes.

Device Networking Configuration


Tera Term - 192.168.10.64 VT
File Edit Setup Control Window Help
System Name: 192.168.10.64 Device Networking Configuration
Site: Local
[F1] Device IP Address : 192_ . 168_ . 10__ . 64__
[F3] Device IP NetMask : 255_ . 255_ . 255_ . 0___
[F4] Default Gateway IP Address: 192_ . 168_ . 10__ . 1___
Running IP Status:
Mac Address : 00.06.88.0F.5B.78
Running IP Address : 192.168.10.64
Running IP NetMask : 255.255.255.0
Running Gateway IP Address: 192.168.10.1
Confirm[F2] Set Only[F5] Back[ESC]

Device Networking Configuration Screen

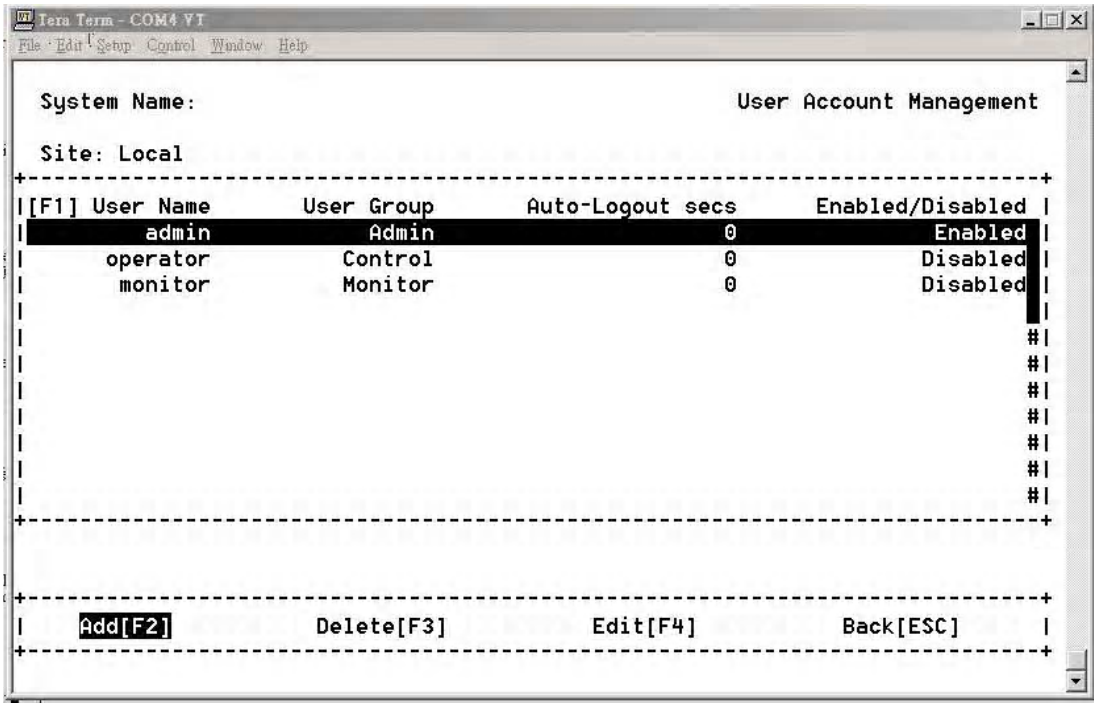
Setting the device IP

You can set the device IP of the front panel MGMT port in this screen. The MGMT port IP address is static, so make sure there isn't a conflict on your network prior to confirming the settings.

Press **`Confirm[F2]`** to execute your changes and direct the system to use those settings immediately. Your changes will now be reflected as the running IP status.

Press **`Set Only[F5]`** when making IP changes that will only be held in temporary memory, without committing the changes to the running IP. Press **`Confirm[F5]`** to commit your temporary settings as the running IP.

User Account Management



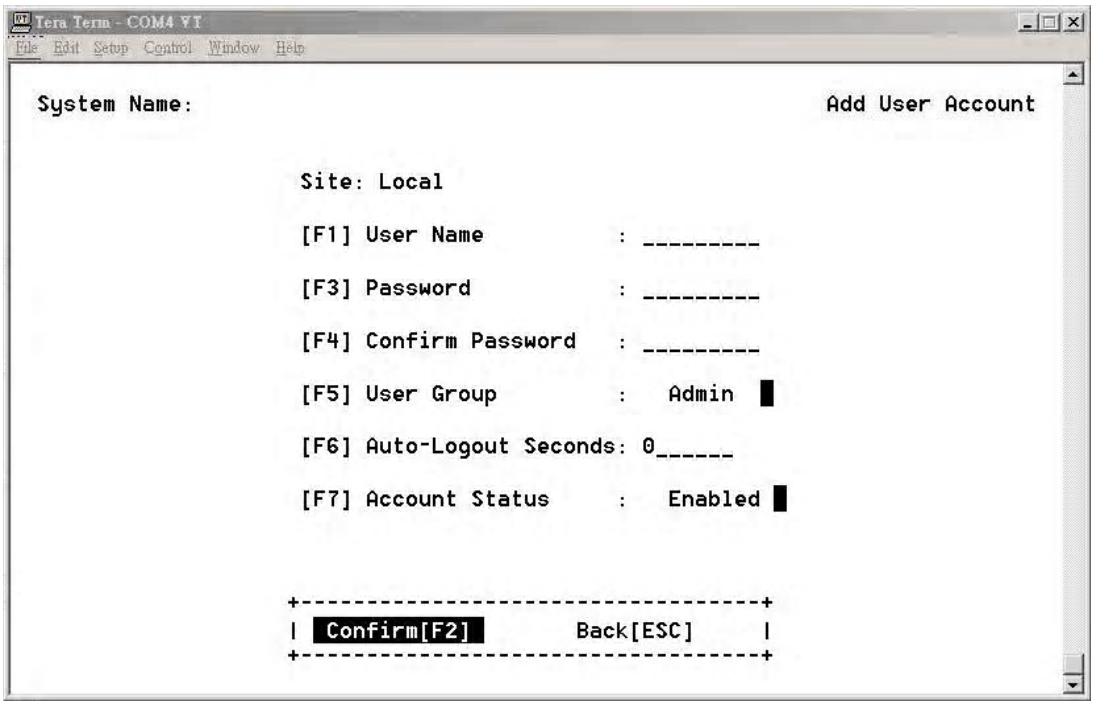
User Account Management Screen

Setting System Access Groups

The iMux provides three kinds of the user groups.

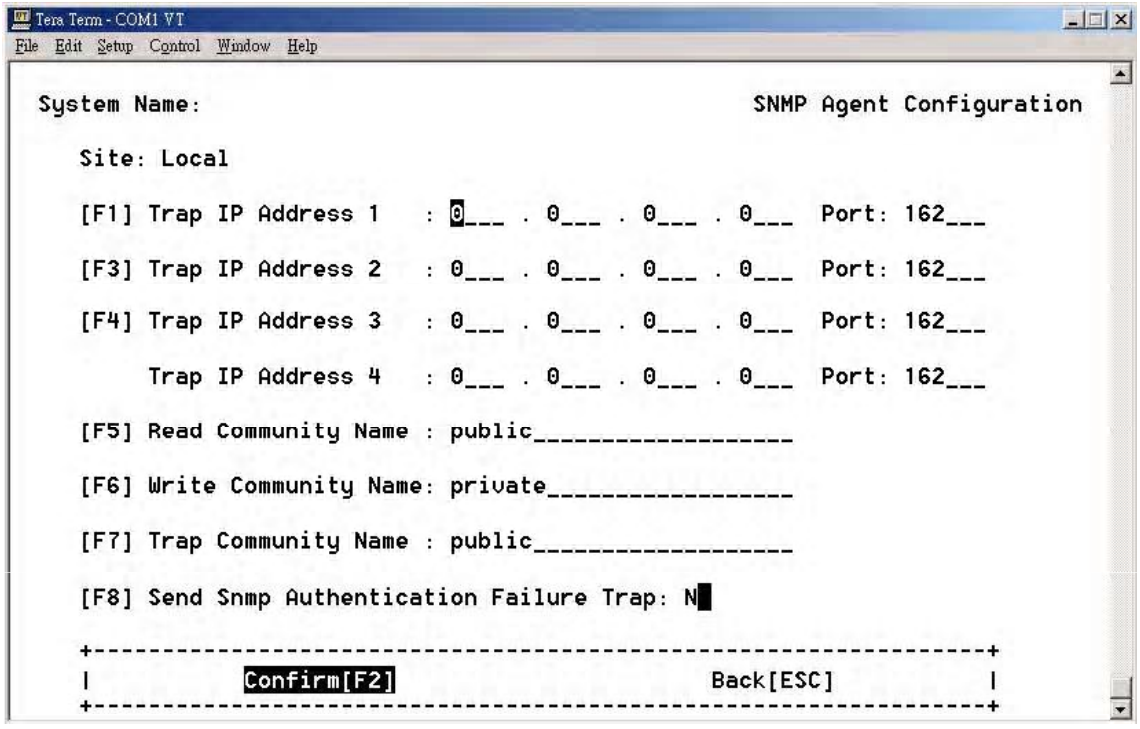
- **Admin** The administrator group account can execute all functions.
- **Control** The controller group account can execute all functions except the System Configuration.
- **Monitor** The monitor group account only can monitor the system.

User accounts may be added **[F2]**, deleted **[F3]**, or edited **[F4]**.



Selecting **Add[F2]** opens the **Add User Account** screen. This is where new user accounts are set up. Each user may have their own password and be assigned to a Group. Setting the Auto-Logout to 0 (zero) seconds disables Auto-Logout. User accounts may also be disabled in this menu without deleting them.

SNMP Agent Configuration


Tera Term - COM1 VT
File Edit Setup Control Window Help
System Name:
SNMP Agent Configuration
Site: Local
[F1] Trap IP Address 1 : 0___ . 0___ . 0___ . 0___ Port: 162___
[F3] Trap IP Address 2 : 0___ . 0___ . 0___ . 0___ Port: 162___
[F4] Trap IP Address 3 : 0___ . 0___ . 0___ . 0___ Port: 162___
Trap IP Address 4 : 0___ . 0___ . 0___ . 0___ Port: 162___
[F5] Read Community Name : public_____
[F6] Write Community Name: private_____
[F7] Trap Community Name : public_____
[F8] Send Snmp Authentication Failure Trap: N
Confirm[F2]
Back[ESC]

Setting the Trap IP

The iMux can assign four sets of the Server IP address for sending the Traps. Enter the IP address and port number information on each line as required. Three community names may also be set. Default names are pre-configured, but may be changed using the menu items [**F5**], [**F6**] and [**F7**].

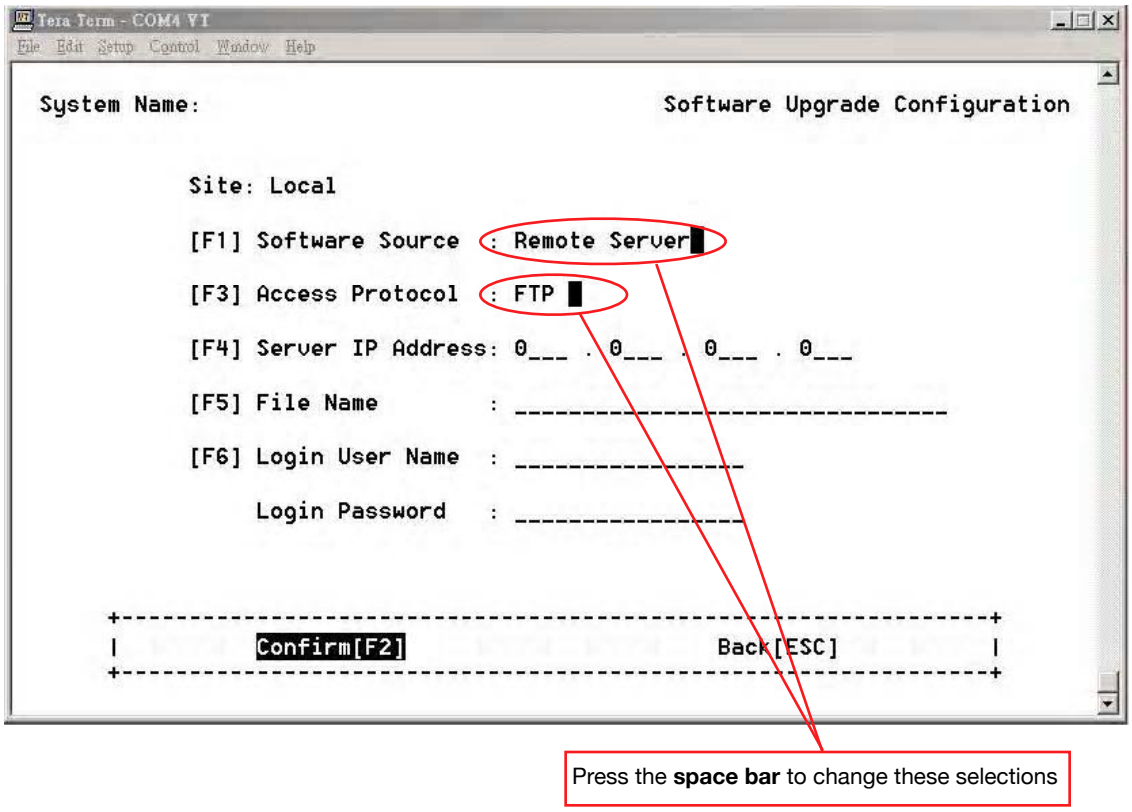
- The default Read Community Name is **public**
- The default Write Community is **private**
- The default Trap Community is **public**

Press **[F8]** to enable the **Send SNMP Authentication Failure Trap** function for sending the trap when the authentication fails.

Software Upgrade Configuration

The iMux can support two kinds of the System Software Upgrade: **Remote Server** and **Local File**.

Remote Server


Tera Term - COM4 VT
File Edit Setup Control Window Help
System Name:
Software Upgrade Configuration
Site: Local
[F1] Software Source : Remote Server
[F3] Access Protocol : FTP
[F4] Server IP Address: 0___ . 0___ . 0___ . 0___
[F5] File Name :
[F6] Login User Name :
Login Password :
Confirm[F2]
Back[ESC]
Press the space bar to change these selections

For Remote server source selection:

[F3] Access Protocol: Select the protocol you want to use. You may use either FTP or TFTP.
[F4] Server IP Address: Enter the server IP address where the new firmware is saved.

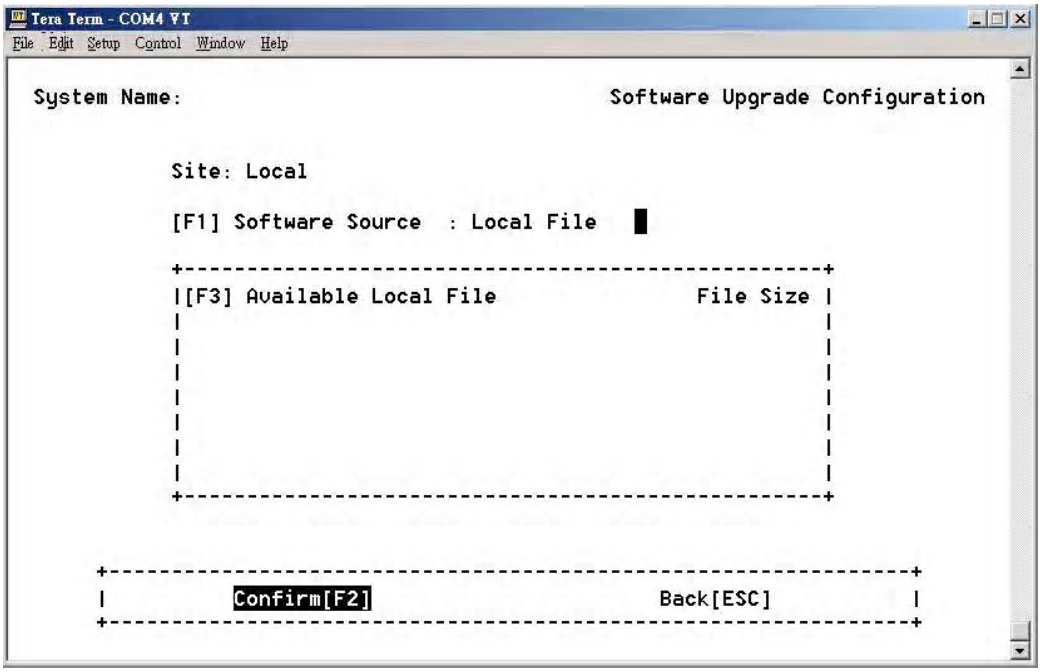
[F5] File Name: Enter the file name of new firmware.

[F6] Login User Name: Enter the remote server's user name.

Login Password: Enter the remote server's password.

Local File

For Local File source selection, the screen will show the available file stored in the system.



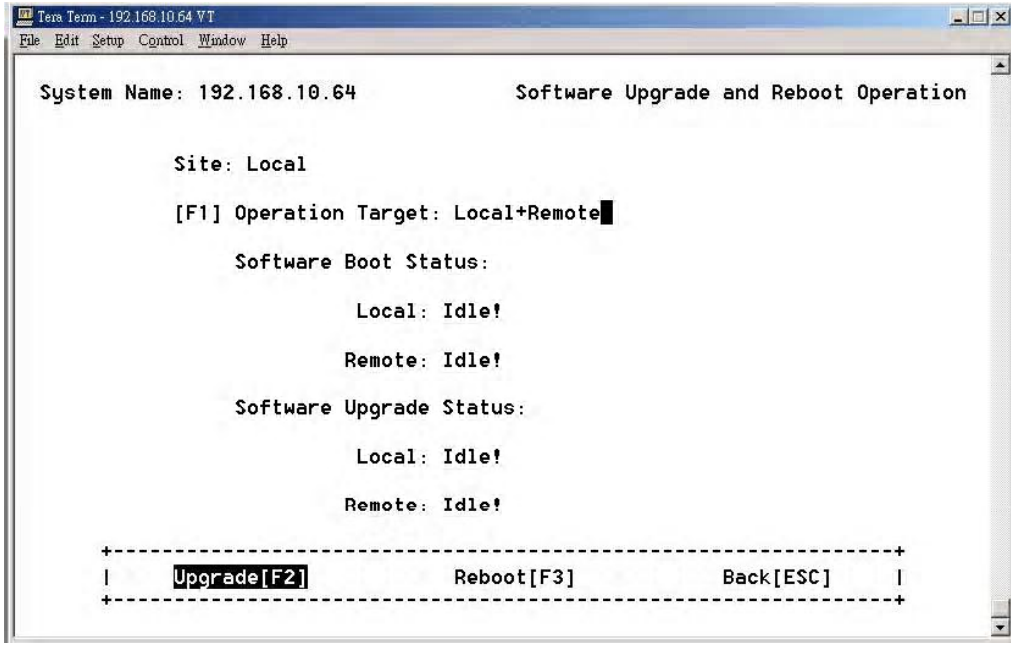
Local Upgrade File Selection Screen

Note: If the software upgrade image is stored locally, and you restart or re-boot power, that software image will be deleted.

Choose **Confirm[F2]** to save your selection.

Software Upgrade and Reboot Operation

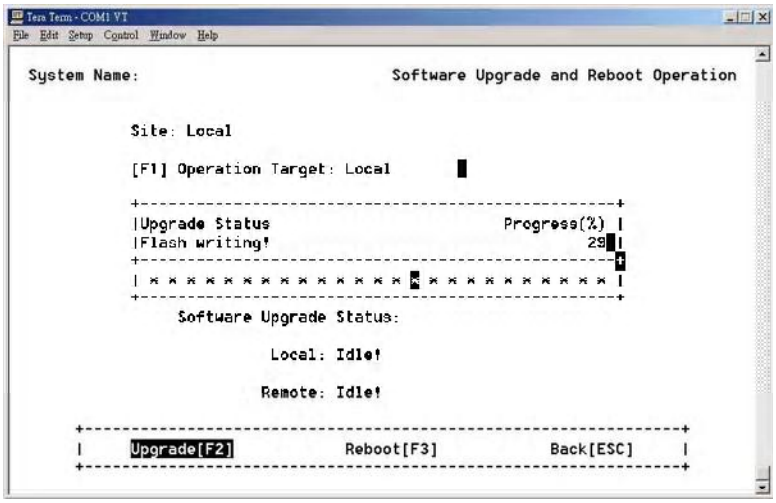
After the software upgrade configuration is completed, the **Software Upgrade and Reboot Operation** can be executed from this menu.



Upgrade Status

When you execute the Upgrade[F2] commend item in the local or remote side, it will display the upgrade status including:

Start upgrading!
Connecting!
Transferring!
Loading!
DeCompressing!
Flash writing!
Sending!
Upgrading complete!
None



Upgrade Error Messages

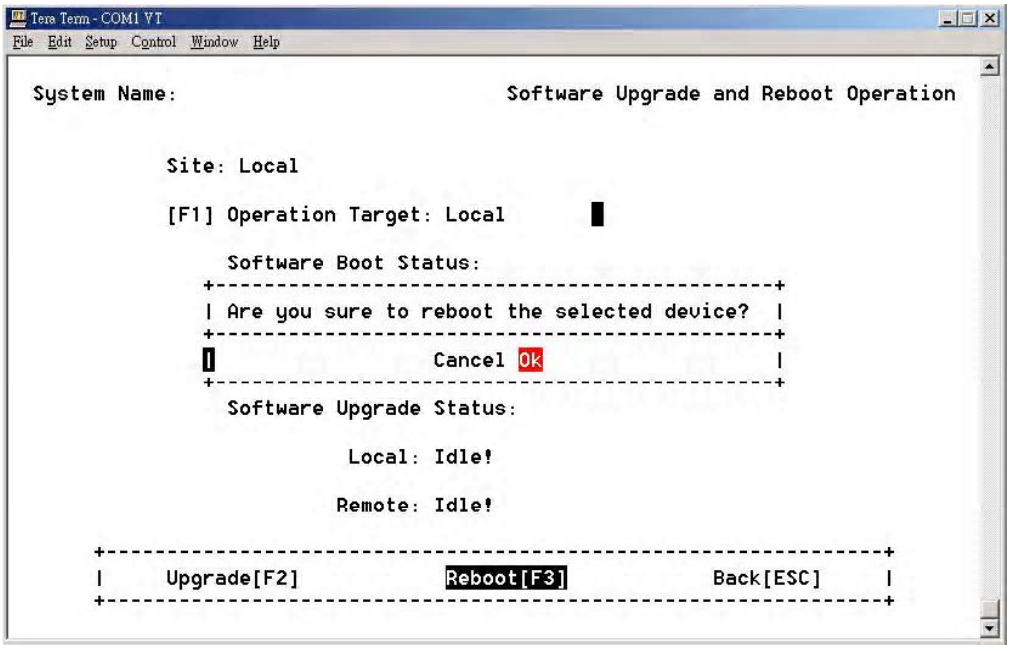
If the software upgrade has an error, it will display one of the following error messages:

Internal error!
Local file not found!
Information incomplete!
Upgrading is running!
Connect failed!
Transfer failed!
Read failed!
Image file too large!
Disconnect failed!
Decompress code failed!
Invalid image format!
Abort by user!
None!

Software Reboot Status

When user selects the **[F3]** Reboot commend item in local or remote side, it will display the status including:

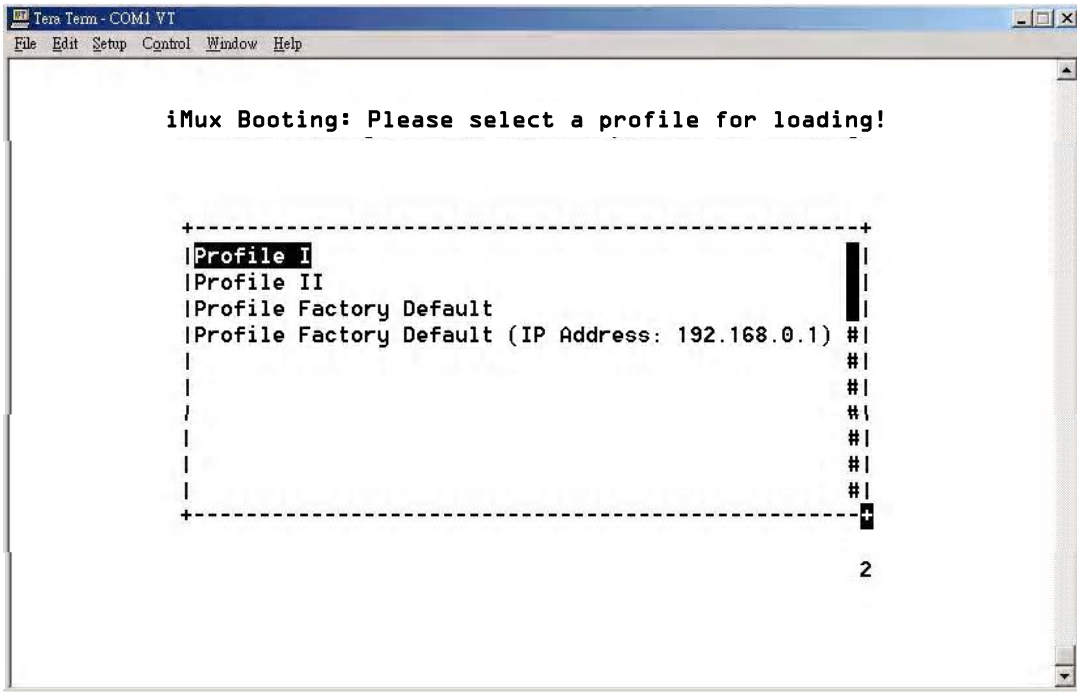
Start rebooting!
Ongoing!
Complete
Bye-!
None



Reboot Operation Screen

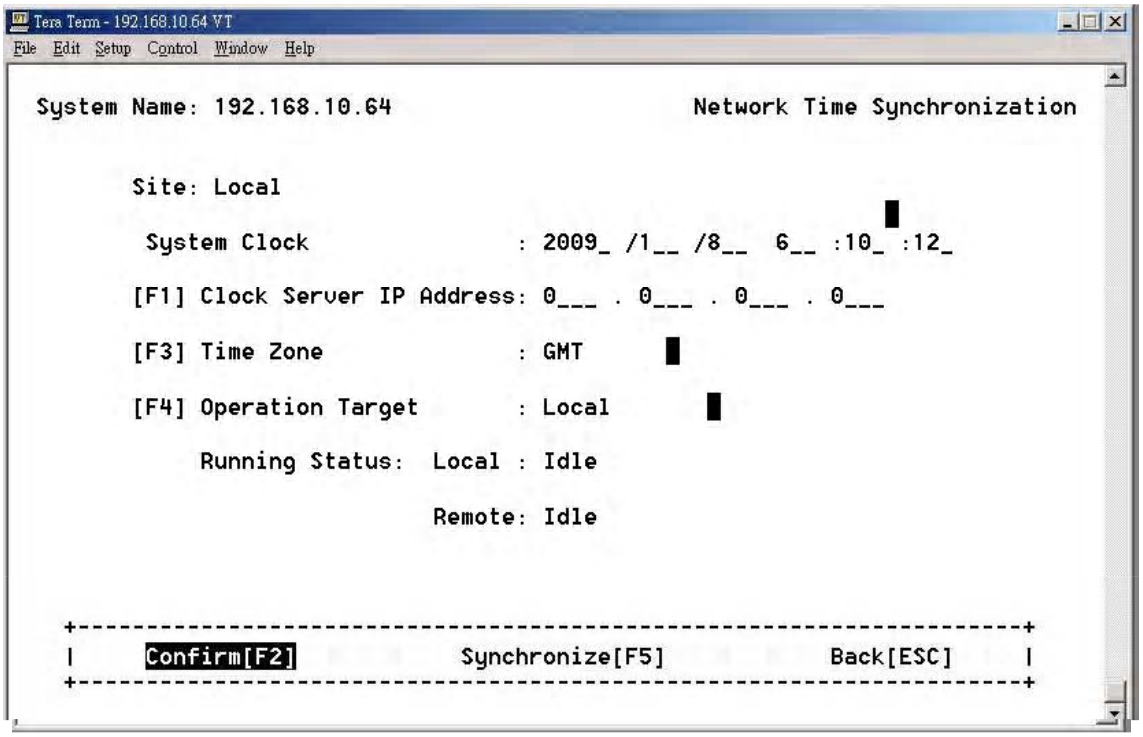
When the iMux Booting screen appears, select a profile for loading. Use the up and down arrow keys to change selections, and press the enter key to load the selected profile.

Note: If no key is pressed within three seconds, then the system will automatically download the previous profile. Press any key to hold and pause the screen.


Tera Term - COM1 VT
File Edit Setup Control Window Help
iMux Booting: Please select a profile for loading!
Profile I
Profile II
Profile Factory Default
Profile Factory Default (IP Address: 192.168.0.1)
2

Reboot profile Selection Screen

Network Time Synchronization


Tera Term - 192.168.10.64 VT
File Edit Setup Control Window Help
System Name: 192.168.10.64
Network Time Synchronization
Site: Local
System Clock : 2009_ /1__ /8__ 6__ :10_ :12_
[F1] Clock Server IP Address: 0___ . 0___ . 0___ . 0___
[F3] Time Zone : GMT
[F4] Operation Target : Local
Running Status: Local : Idle
Remote: Idle
Confirm[F2]
Synchronize[F5]
Back[ESC]

Network Time Synchronization Screen

You may set the System clock manually, or use the network time synchronization function. To use a time server press **[F1]** and enter the time server IP address and time zone, then execute the **Synchronize[F5]** command. The system clock will be automatically set via Internet.

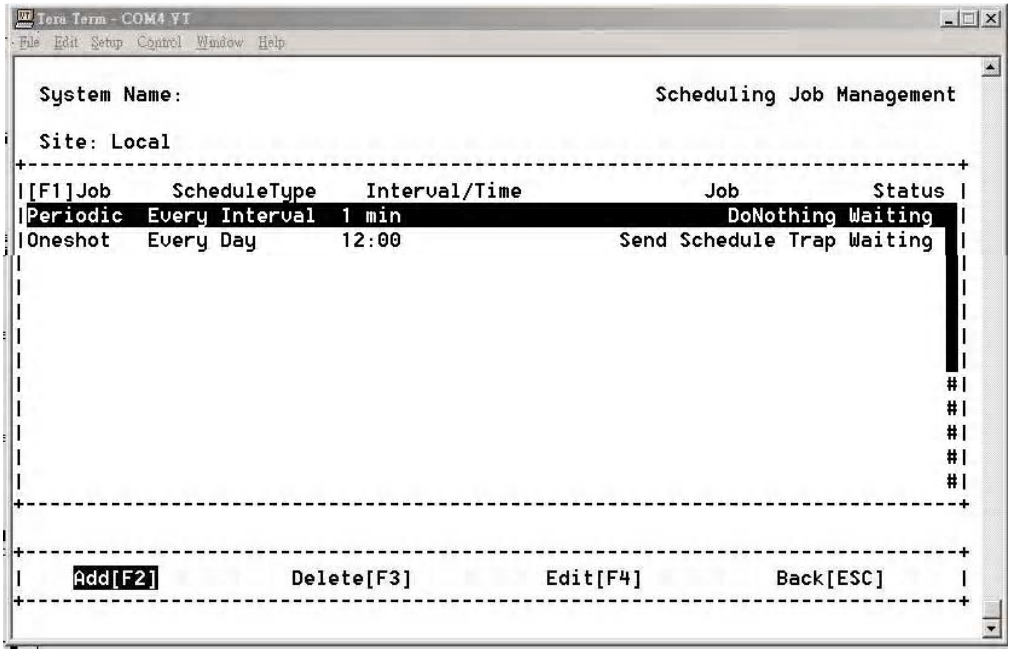
When user selects the synchronize commend item in local or remote side, the running status will show the following messages:

Start Synchronizing!
Synchronizing!
Synchronizing Complete!
Synchronizing Error!

If there is a synchronize error, the iMux will display one of the following error messages:

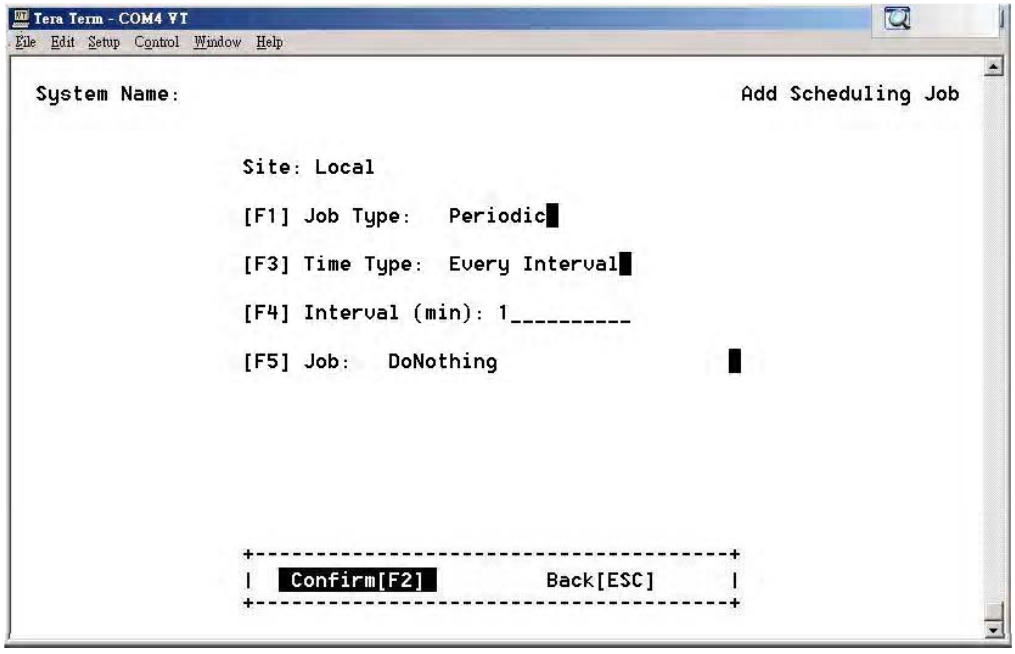
Internal Error!
Information Incomplete!
Synchronization is running!
Time Get Error!
Abort by user!
Timeout!
No Error

Scheduling Job Management


Tera Term - COM4 VT
File Edit Setup Control Window Help
System Name:
Scheduling Job Management
Site: Local
[F1]Job ScheduleType Interval/Time Job Status
Periodic Every Interval 1 min DoNothing Waiting
Oneshot Every Day 12:00 Send Schedule Trap Waiting
Add[F2] Delete[F3] Edit[F4] Back[ESC]

Scheduling Job Management Screen

The **Scheduling Job Management** function directs the iMux to perform certain job functions at specific times. The system administrator can arrange the schedule for each job.



Add Scheduling Job Screen

- Job Type: **Periodic** / **One shot** / **Booting**
- Time Type: **Every Interval** / **Every Day**

Every Interval: The system will do the selected job at every time interval.

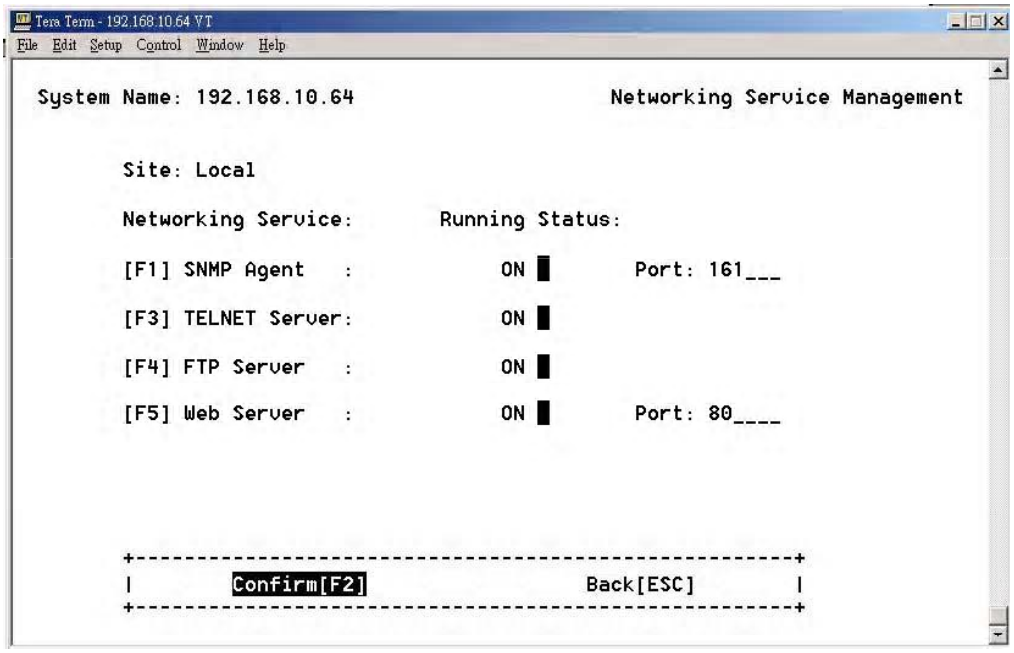
Every Day: The system will do the selected job at the desired time every day, according to the system time.

Interval (min.): Enter a number to set the interval time

Job: Do Nothing
Send Schedule Trap
Send Time Sync Request Trap
Software Upgrade
Network Time Synchronization
System Reboot

Press the space bar to change the selected item.

Networking Service Management



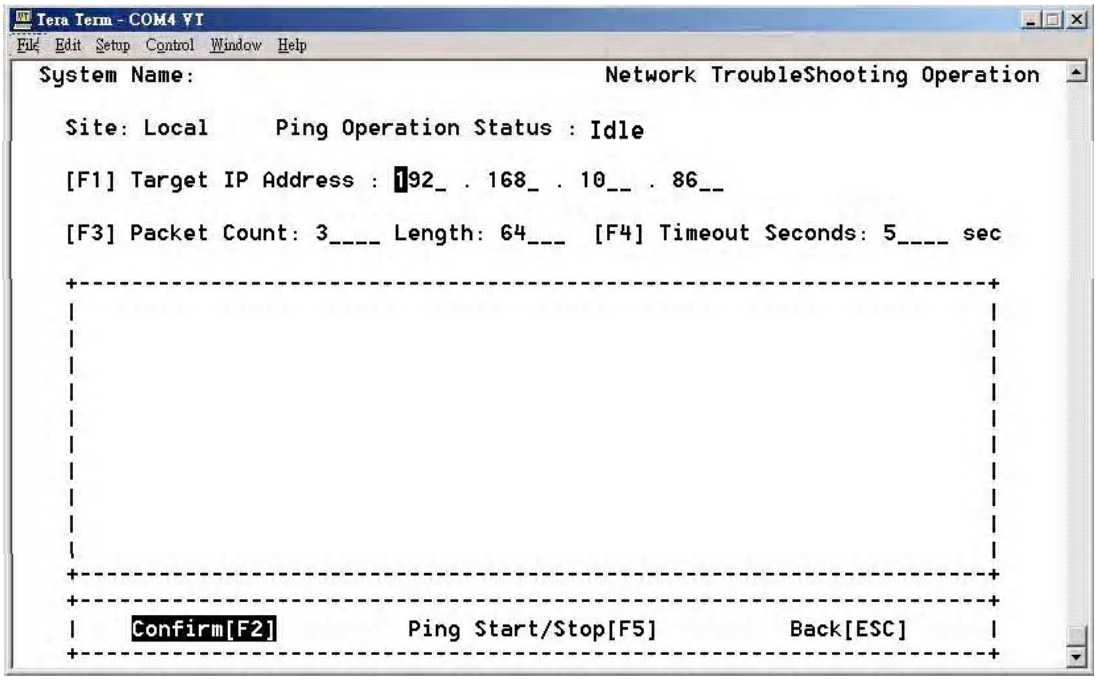
Network Service Management Screen

The system can turn on or off the functions of the SNMP Agent, TELNET Server, FTP Server, and Web Server.

When using the FTP Server, the device can act as a client or server. However the memory storage is small, so the user can only to perform a software upgrade and save EventLog operation.

Note: If the software upgrade image is stored locally, and you restart or re-boot power, the software image will be deleted.

Network TroubleShooting Operation


Tera Term - COM4 VT
File Edit Setup Control Window Help
System Name:
Network TroubleShooting Operation
Site: Local
Ping Operation Status : Idle
[F1] Target IP Address : 192_ . 168_ . 10__ . 86__
[F3] Packet Count: 3____ Length: 64___ [F4] Timeout Seconds: 5____ sec
Confirm[F2]
Ping Start/Stop[F5]
Back[ESC]

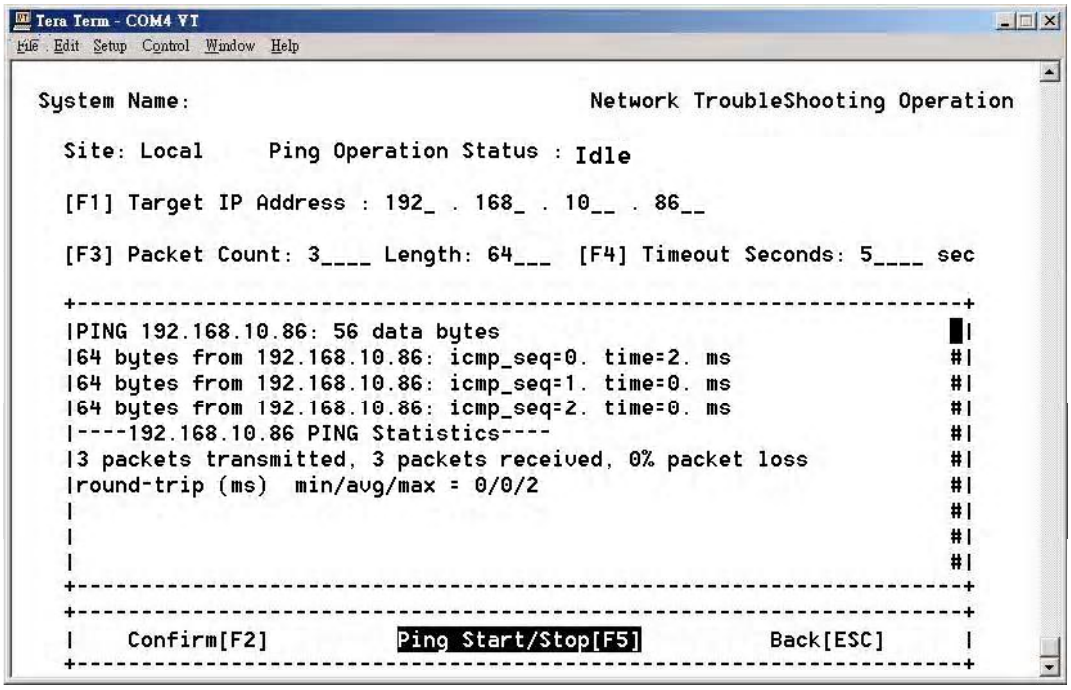
Network Ping Operation Screen

The iMux can ping an IP address to show whether it can link to a network location, and provide some information about that connection.

Enter the **`[F1]Target IP Address`**, **`[F3]Packet Count`**, **`Length`** and **`Timeout Seconds`**, then execute **`Confirm[F2]`** to save your entered information. Execute **`Ping Start/Stop[F5]`** to start the ping operation.

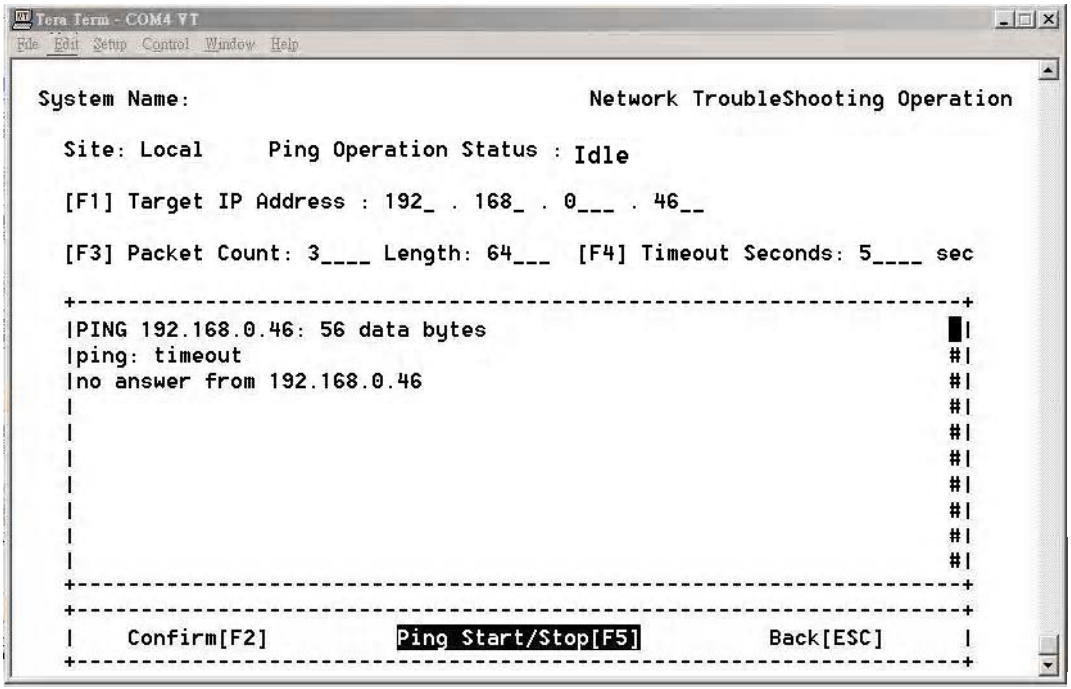
Note: The system device IP must be set up prior to performing the ping operation.

If the target IP ping succeeds, it will display the results similar to this:


Tera Term - COM4 VT
File Edit Setup Control Window Help
System Name: Network TroubleShooting Operation
Site: Local Ping Operation Status : Idle
[F1] Target IP Address : 192_ . 168_ . 10__ . 86__
[F3] Packet Count: 3____ Length: 64___ [F4] Timeout Seconds: 5____ sec
|PING 192.168.10.86: 56 data bytes
|64 bytes from 192.168.10.86: icmp_seq=0. time=2. ms
|64 bytes from 192.168.10.86: icmp_seq=1. time=0. ms
|64 bytes from 192.168.10.86: icmp_seq=2. time=0. ms
|----192.168.10.86 PING Statistics----
|3 packets transmitted, 3 packets received, 0% packet loss
|round-trip (ms) min/avg/max = 0/0/2
Confirm[F2] Ping Start/Stop[F5] Back[ESC]

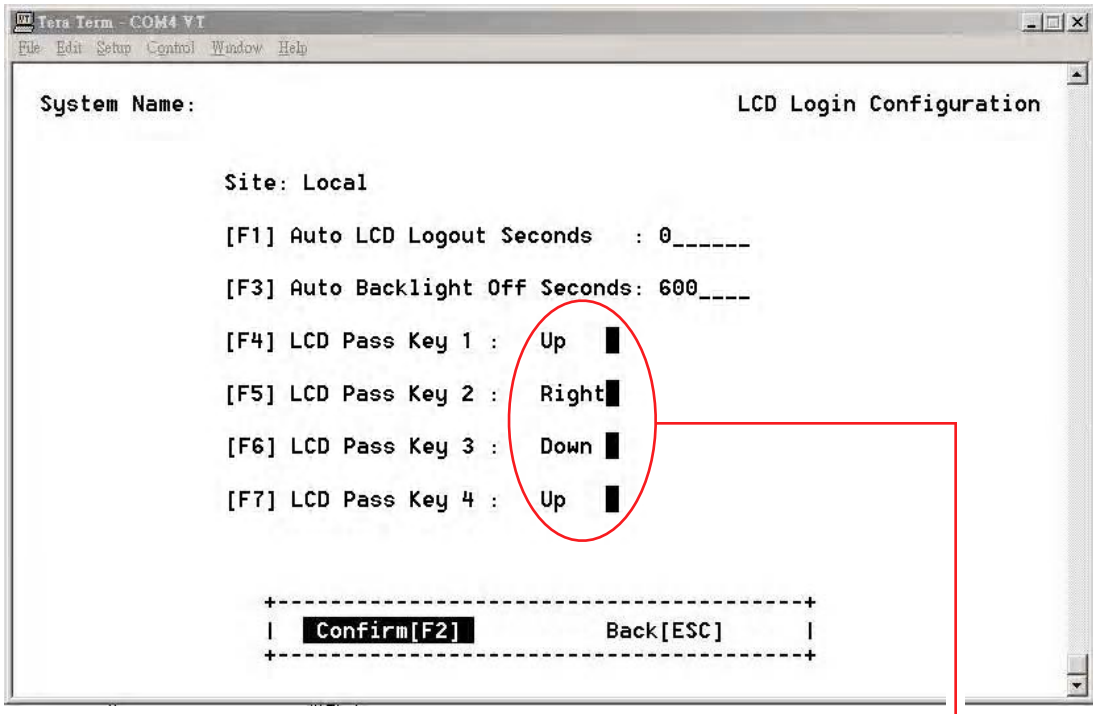
Successful Ping Results Screen

If the target IP does not answer, it will timeout with no response.

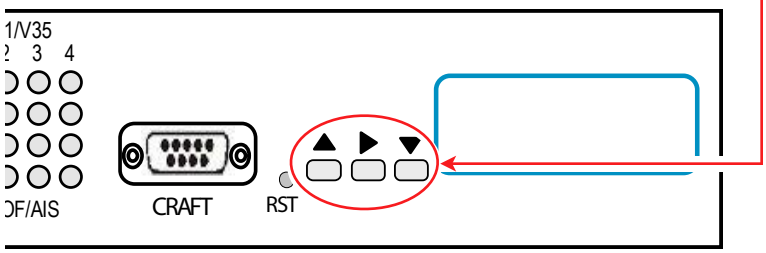

Tera Term - COM4 VT
File Edit Setup Control Window Help
System Name: Network TroubleShooting Operation
Site: Local Ping Operation Status : Idle
[F1] Target IP Address : 192_ . 168_ . 0___ . 46__
[F3] Packet Count: 3____ Length: 64___ [F4] Timeout Seconds: 5____ sec
|PING 192.168.0.46: 56 data bytes
|ping: timeout
|no answer from 192.168.0.46
Confirm[F2] Ping Start/Stop[F5] Back[ESC]

Ping Failure Screen

LCD Login Configuration


Tera Term - COM4 VT
File Edit Setup Control Window Help
System Name:
LCD Login Configuration
Site: Local
[F1] Auto LCD Logout Seconds : 0_____
[F3] Auto Backlight Off Seconds: 600____
[F4] LCD Pass Key 1 : Up
[F5] LCD Pass Key 2 : Right
[F6] LCD Pass Key 3 : Down
[F7] LCD Pass Key 4 : Up
Confirm[F2]
Back[ESC]

LCD Login Configuration Screen



Front Panel LCD Controls

The front panel login uses the UP, RIGHT and DOWN buttons pressed in a 4 key sequence in order to gain access using the front panel. Define this key sequence by setting the pass keys using the LCD Login Screen.

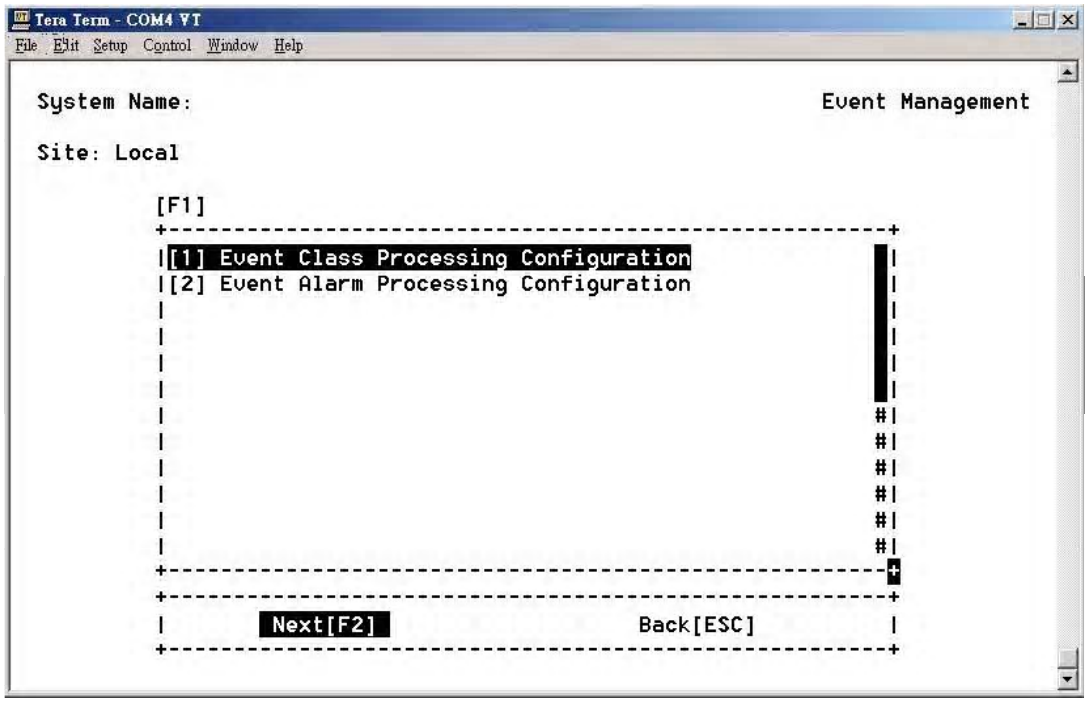
Up uses the ▲ button on the front panel.

Right uses the ▶ button on the front panel.

Down uses the ▼ button on the front panel.

Setting the **[F1] Auto LCD Logout Seconds** to zero cancels auto LCD logout.

Event Management

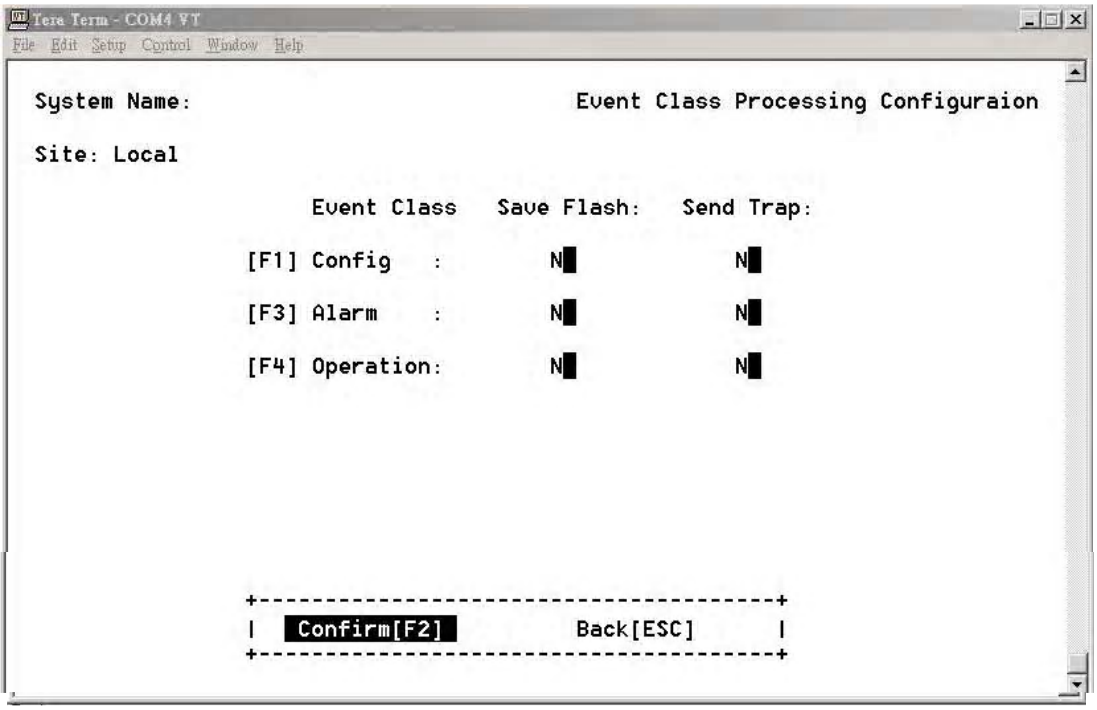


Event Management Screen

The iMux provides Event Management function that includes

[1] Event Class Processing Configuration
[2] Event Alarm Processing Configuration

Event Class Processing Configuration



Event Class Processing Screen

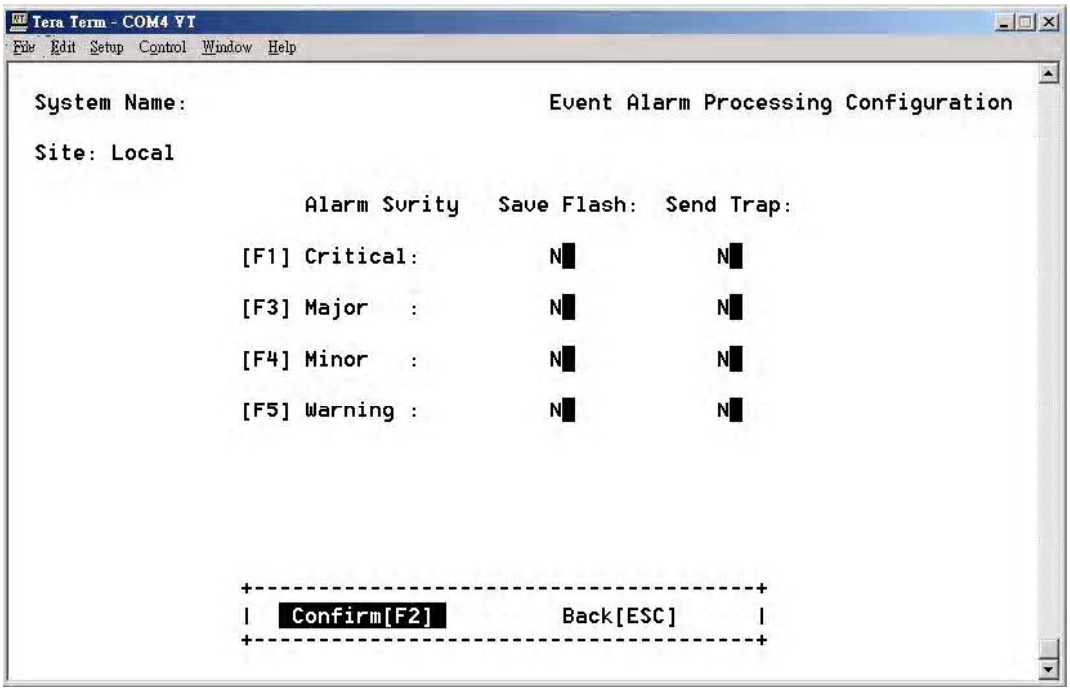
The event class processing configuration function can set the events of the configure, alarm, and operation to save in the flash or to send the trap.

N is not save in the flash or not to send the trap
Y is save in the flash or to send the trap

Use the **`Confirm[F2]`** command to save the settings.

> **Note:** Confirm the send trap status if the NMS system does not receive an alarm trap.

Event Alarm Processing Configuration



Event Alarm Processing Screen

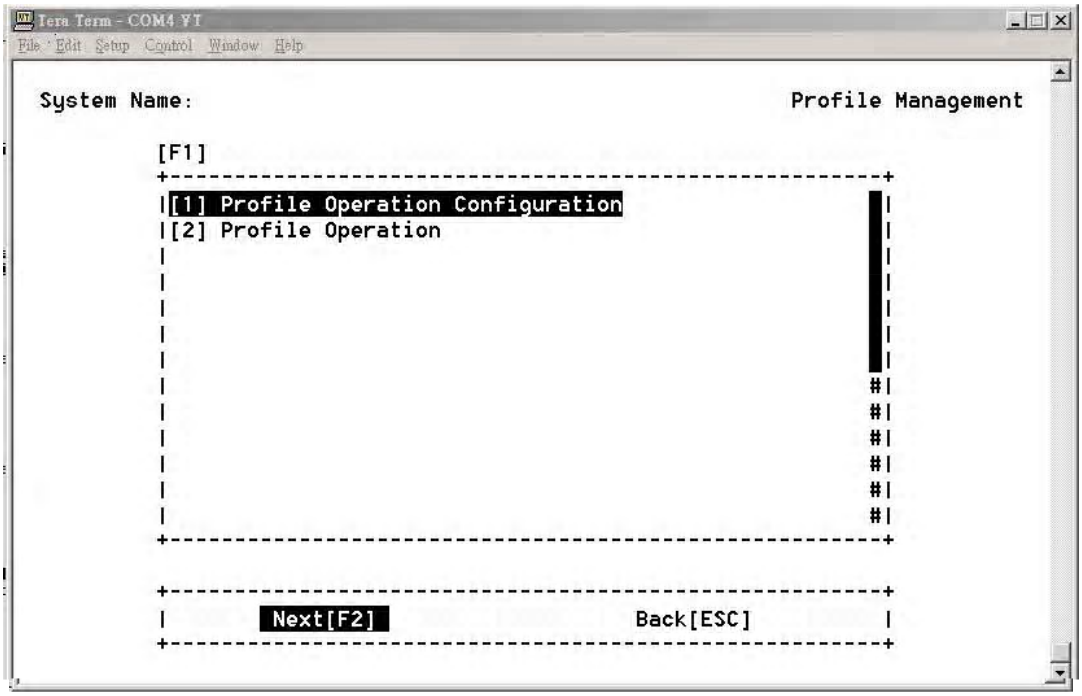
The event alarm processing configuration function controls how different alarm events are handled based on severity. These events may be set to save in flash memory or to send the trap.

The four classes of the alarm severity are:

[F1] Critical
[F3] Major
[F4] Minor
[F5] Warning

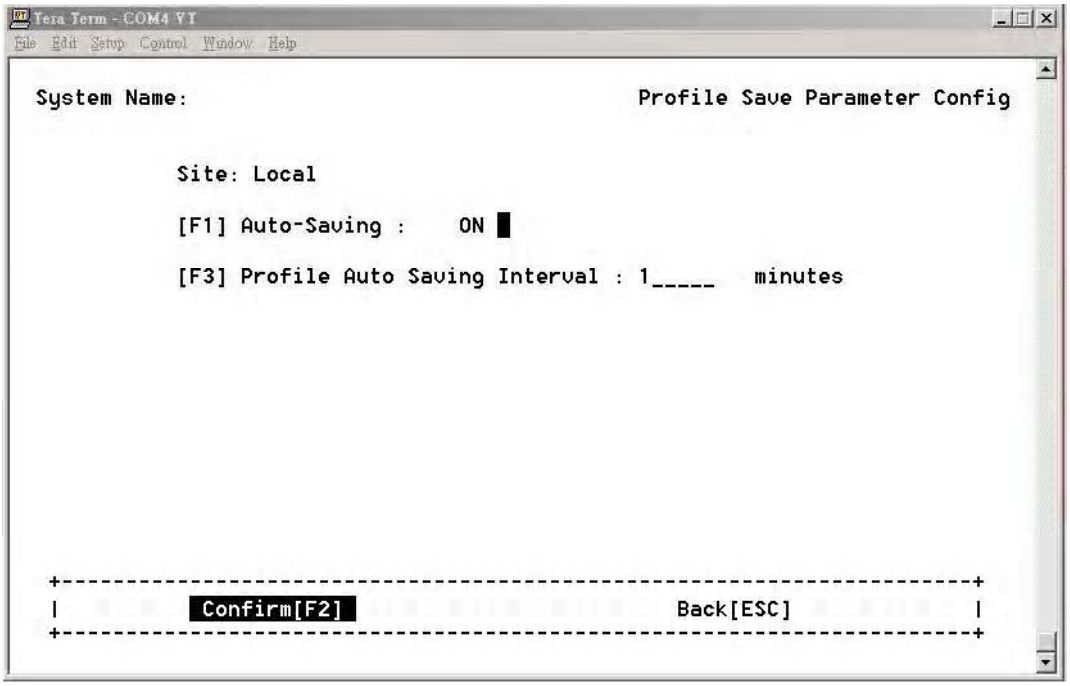
Note: Confirm the send trap status if the NMS system does not receive an alarm trap.

System Profile Management



Profile Management

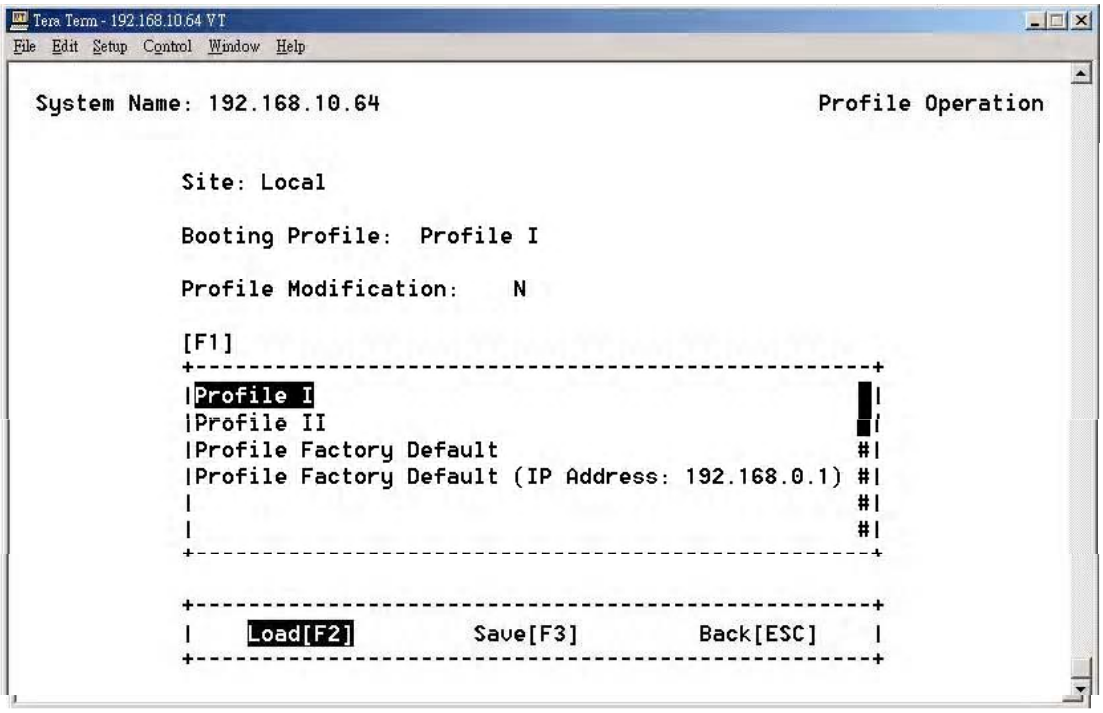
Select **[1] Profile Save Parameter Configuration** and then **Next[F2]**.



Profile Saving Configuration

Set the **[F1] Auto Saving** to **ON** and the auto saving interval in minutes to enable auto profile saving.

From the Profile Management screen select **[2] Profile Operation** and then **Next[F2]**.



Profile Operation

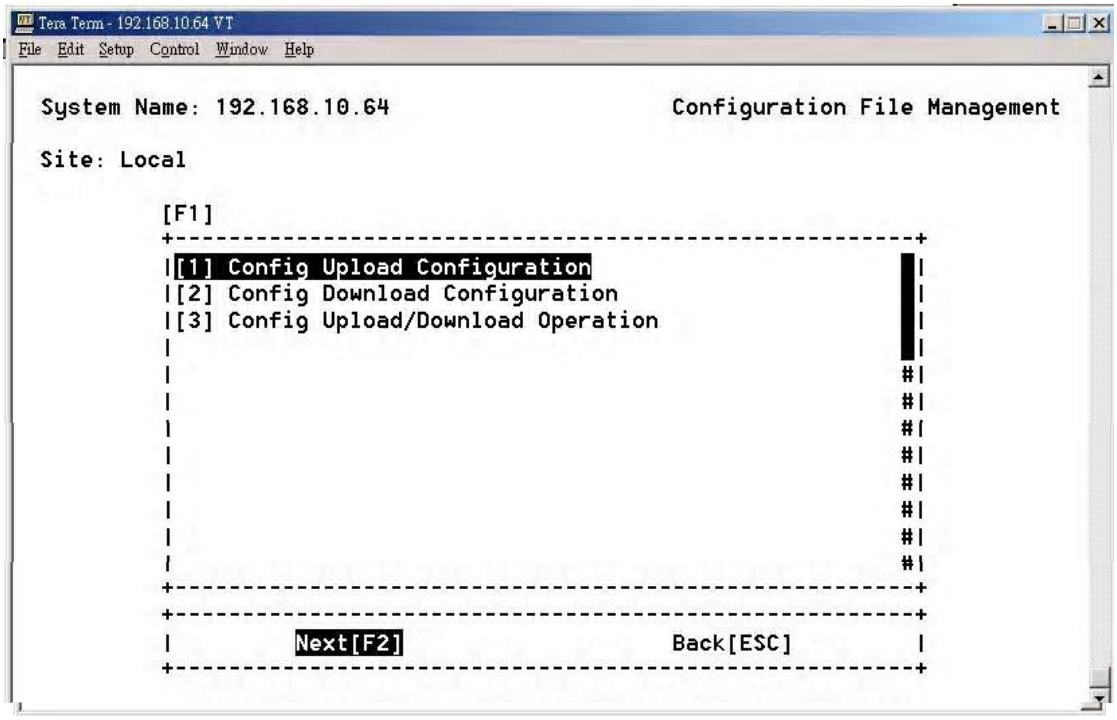
This screen allows you to modify boot profiles. Although there are are four booting profiles, only **Profile I** and **Profile II** may be user modified. **Profile Factory Default** and **Profile Factory Default (IP Address: 192.168.0.1)** profiles may not be altered.

Note: The iMux has been pre-configured with appropriate settings for the modules that were installed at the time it left the factory. These settings were initially saved in both **Profile I** and **Profile II**. Changing these settings will alter the initial factory settings.

The **Profile Modification** will show **Y** if the profile has been changed anytime before loading the profile.

Select either **Profile I** or **Profile II** and press **Load[F2]** to open the profile for editing or review.

Configuration File Management



Configuration File Management Screen

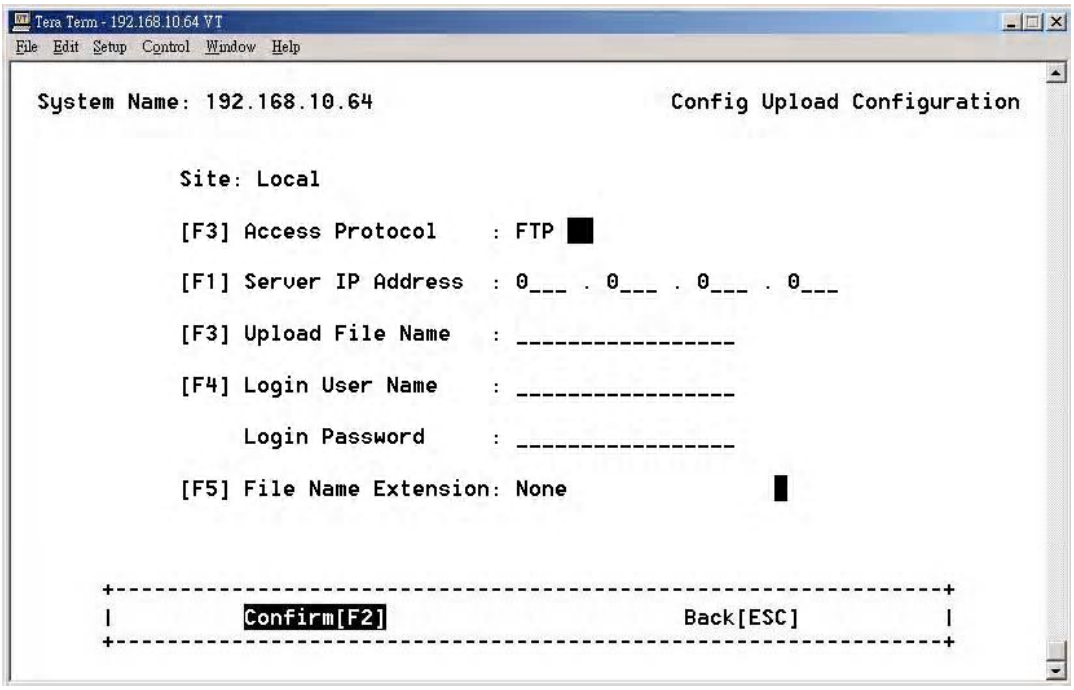
You may upload or download profile configurations and easily apply it to any iMux. This allows allows you to load a profile, or upload a profile to a server for archiving, saving, or further distribution. A profile may be created at a remote location, uploaded to a server, and downloaded to another iMux for use.

First, you will specify the server and file names using **`[1] Config Upload Configuration`** and **`[2] Config Download Configuration.`** Once the configurations are set, return to this menu and initiate the transfer using **`[3] Config Upload/Download Operation.`**

Then choose **`Next[F2]`** to continue.

> **Note:** The system device IP must be set up prior to uploading or downloading.

[1] Config Upload Configuration


Tera Term - 192.168.10.64 VT
File Edit Setup Control Window Help
System Name: 192.168.10.64
Config Upload Configuration
Site: Local
[F3] Access Protocol : FTP
[F1] Server IP Address : 0___ . 0___ . 0___ . 0___
[F3] Upload File Name : _____
[F4] Login User Name : _____
Login Password : _____
[F5] File Name Extension: None
Confirm[F2]
Back[ESC]

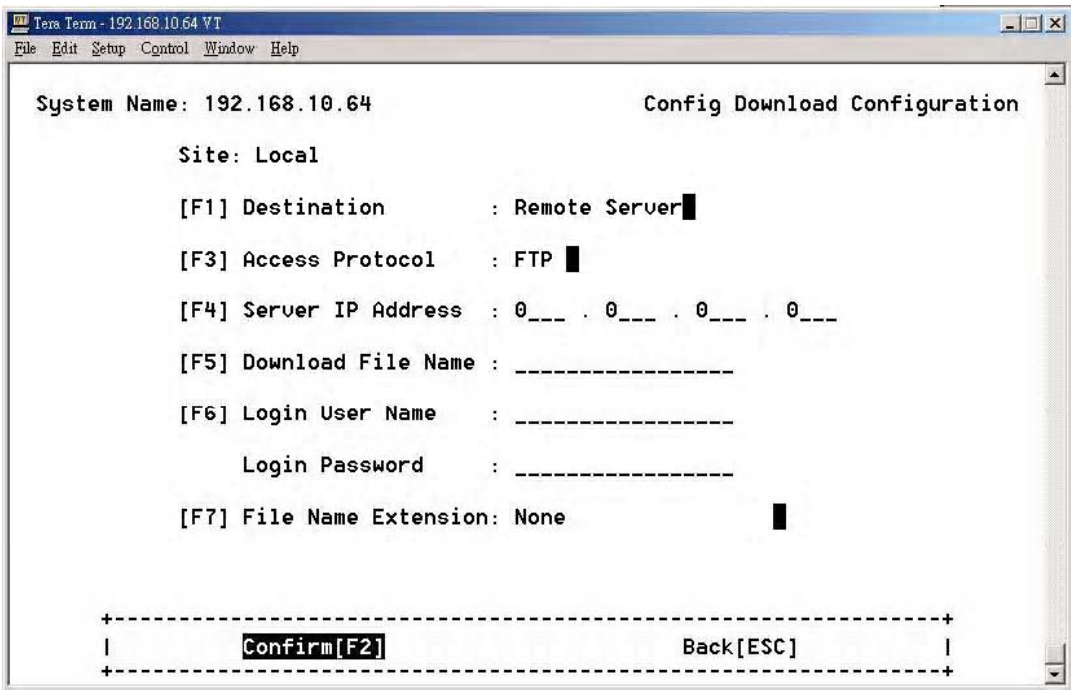
Config Upload Screen

Enter the protocol, server, user and file information to upload.

Selection	Description
[F3] Access Protocol	The desired transfer protocol
[F1] Server IP Address	The server IP address where the new profile will be saved
[F3] Upload File Name	The file name of uploaded profile
[F4] Login User Name	The remote server's user name
Login Password	The remote server's password
[F5] File Name Extension	The desired file name extension

Choose **Confirm[F2]** to save the settings. Go back to the **Configuration File Management** screen using **Back[ESC]** to start the file transfer.

[2] Config Download Configuration


Tera Term - 192.168.10.64 VT
File Edit Setup Control Window Help
System Name: 192.168.10.64 Config Download Configuration
Site: Local
[F1] Destination : Remote Server
[F3] Access Protocol : FTP
[F4] Server IP Address : 0___ . 0___ . 0___ . 0___
[F5] Download File Name : _____
[F6] Login User Name : _____
Login Password : _____
[F7] File Name Extension: None
Confirm[F2]
Back[ESC]

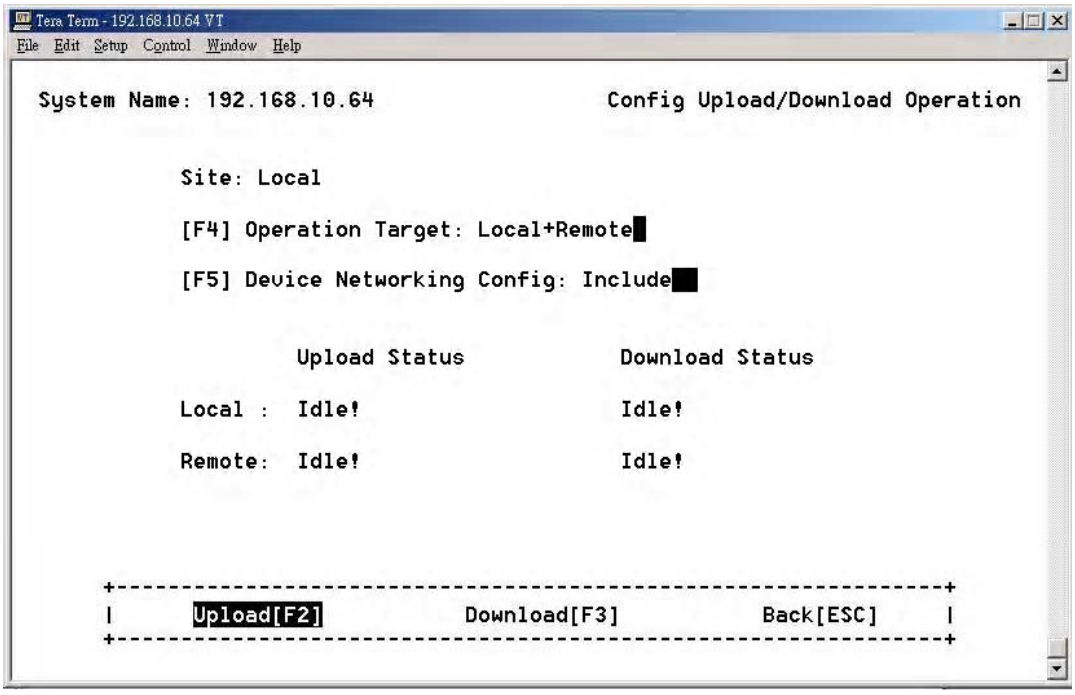
Config Download Configuration Screen

Enter the protocol, server, user and file information to upload.

Selection	Description
[F1] Destination	Where the desired file resides
[F3] Access Protocol	The desired transfer protocol
[F1] Server IP Address	The server IP address where the new profile will obtained from
[F3] Download File Name	The file name of file to download
[F4] Login User Name	The remote server's user name
Login Password	The remote server's password
[F5] File Name Extension	The desired file name extension

Choose **Confirm[F2]** to save the settings. Go back to the **Configuration File Management** screen using **Back[ESC]** to start the file transfer.

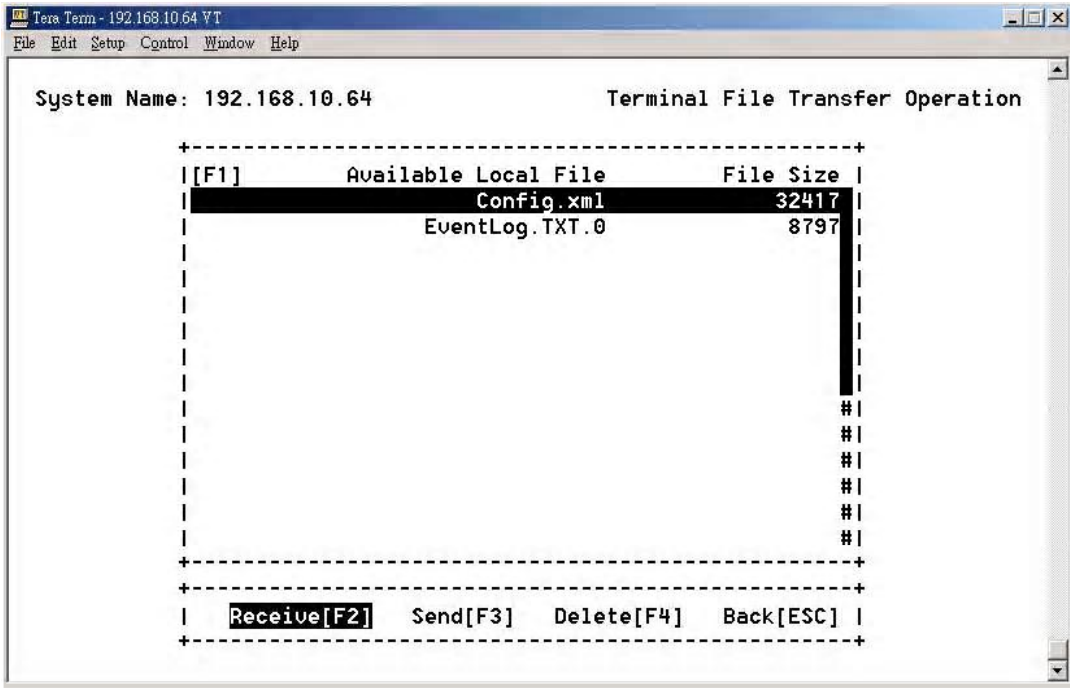
[3] Config Upload/Download Operation



Config Upload/Download Screen

Choose the **Operation Target** and **Device Networking Config**, then execute **Upload[F2]** or **Download[F3]** to begin the transfer.

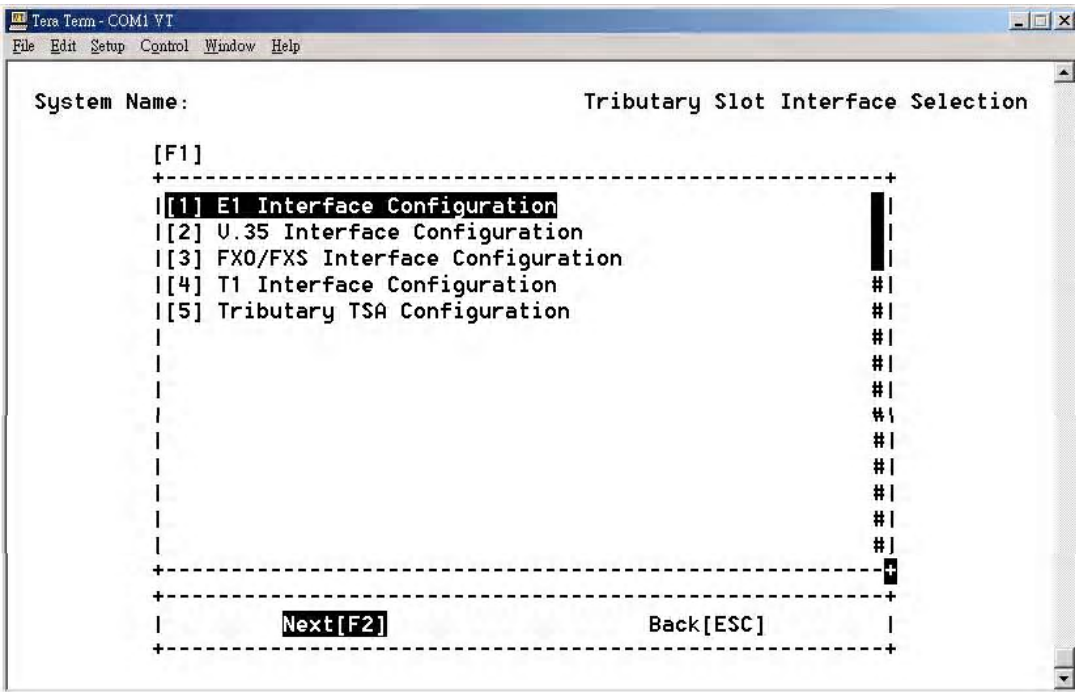
Terminal File Transfer Operation


Tera Term - 192.168.10.64 VT
File Edit Setup Control Window Help
System Name: 192.168.10.64
Terminal File Transfer Operation
[F1] Available Local File File Size
Config.xml 32417
EventLog.TXT.0 8797
Receive[F2] Send[F3] Delete[F4] Back[ESC]

Terminal File Transfer Screen

Available files will be displayed in the file window. Choose the desired file and execute **`Receive[F2]`** or **`Send[F3]`**. Files may also be deleted by using **`Delete[F4]`**.

Tributary Slot Interface Selection



Tributary Slot Configuration Screen

The iMux can use different modules that mount into slots in the back of the unit. These slots are called **Tributary Slots**, and must be configured before they can be used.

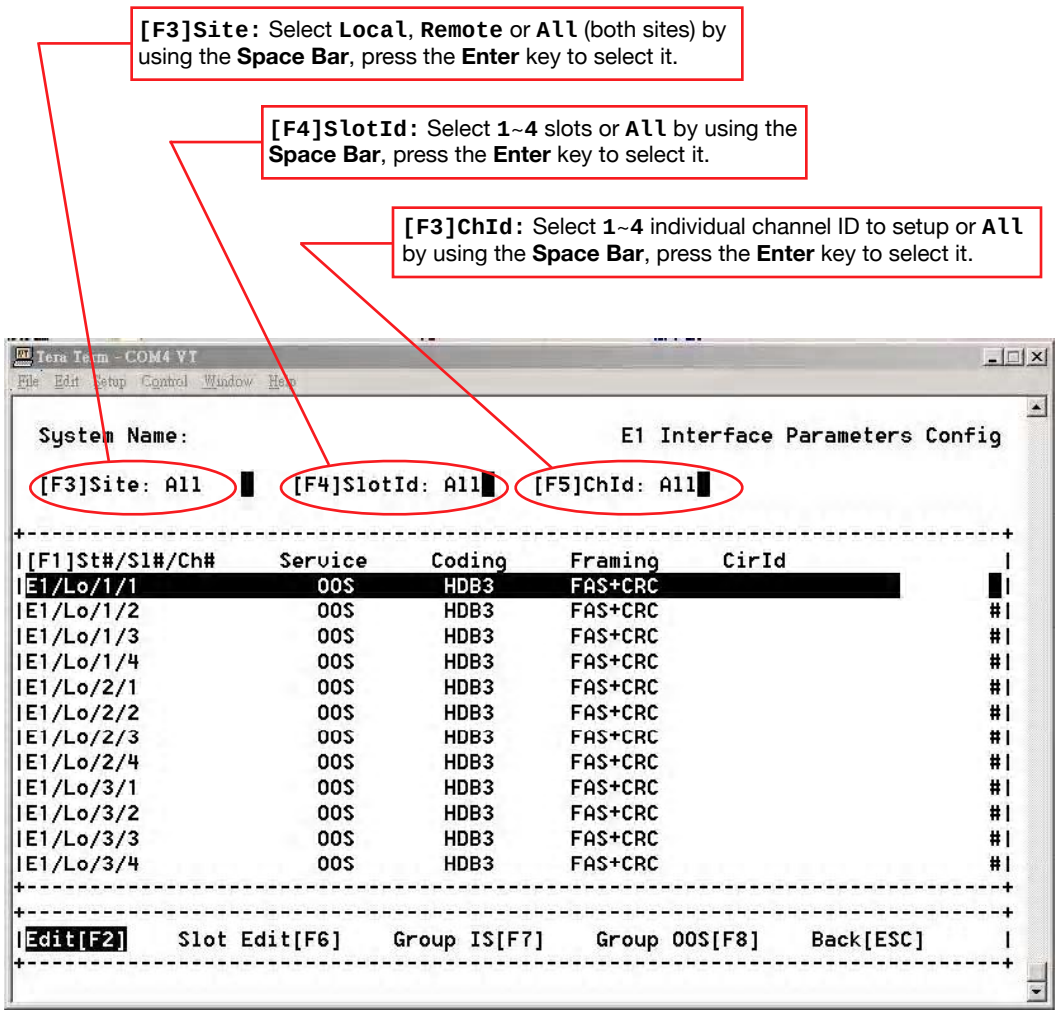
> **Note:** The iMux has been pre-configured with appropriate settings for the Tributary Slots that were used at the time it left the factory. These settings were initially saved in both **Profile I** and **Profile II**. Changing these settings will alter the initial factory settings.

The Tributary Slot parameters and slot assignments are performed on the individual interface configuration screens. To set up the Tributary Slots, select an interface to configure:

`[1] E1InterfaceConfiguration`
`[2] V.35InterfaceConfiguration`
`[3] FXO/FXS Interface Configuration`
`[4] T1InterfaceConfiguration`
`[5] TributaryTSAConfiguration`

Choose **`Next[F2]`** to configure the selected interface and corresponding Tributary Slot.

E1 Interface Configuration


[F3]Site: Select Local, Remote or All (both sites) by using the Space Bar, press the Enter key to select it.
[F4]SlotId: Select 1~4 slots or All by using the Space Bar, press the Enter key to select it.
[F3]ChId: Select 1~4 individual channel ID to setup or All by using the Space Bar, press the Enter key to select it.
Tera Term - COM4 VT
File Edit Setup Control Window Help
System Name:
E1 Interface Parameters Config
[F3]Site: All
[F4]SlotId: All
[F5]ChId: All
[F1]St#/Sl#/Ch# Service Coding Framing CirId
E1/Lo/1/1 OOS HDB3 FAS+CRC
E1/Lo/1/2 OOS HDB3 FAS+CRC
E1/Lo/1/3 OOS HDB3 FAS+CRC
E1/Lo/1/4 OOS HDB3 FAS+CRC
E1/Lo/2/1 OOS HDB3 FAS+CRC
E1/Lo/2/2 OOS HDB3 FAS+CRC
E1/Lo/2/3 OOS HDB3 FAS+CRC
E1/Lo/2/4 OOS HDB3 FAS+CRC
E1/Lo/3/1 OOS HDB3 FAS+CRC
E1/Lo/3/2 OOS HDB3 FAS+CRC
E1/Lo/3/3 OOS HDB3 FAS+CRC
E1/Lo/3/4 OOS HDB3 FAS+CRC
Edit[F2] Slot Edit[F6] Group IS[F7] Group OOS[F8] Back[ESC]

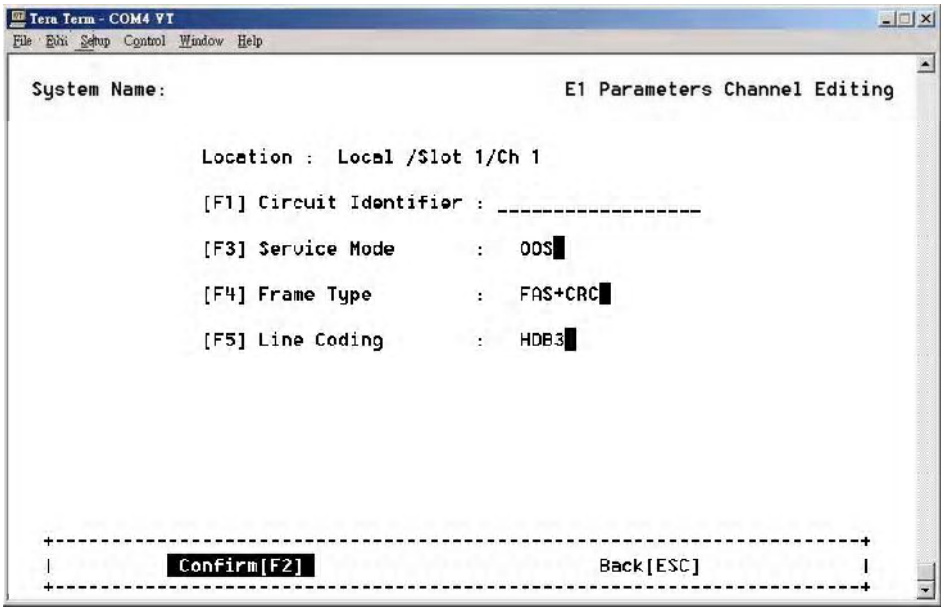
E1 Interface Configuration Screen

Select the iMux site you want to change, the Tributary Slot ID, and the individual channel ID before configuring parameters. You may edit E1 Parameters for each channel or all channels of selected.

Use **`Slot Edit[F6]`** to edit the parameters of all channels in the same slot.

Choose **`Group IS[F7]`** to let the selected channels in the screen go into the in-service state, or **`Group OOS[F7]`** to set them to out of service.

Choose the **Edit[F2]** to set channel service types.


Tera Term - COM4 VT
File Edit Setup Control Window Help
System Name:
E1 Parameters Channel Editing
Location : Local /Slot 1/Ch 1
[F1] Circuit Identifier : _____
[F3] Service Mode : OOS
[F4] Frame Type : FAS+CRC
[F5] Line Coding : HDB3
Confirm[F2]
Back[ESC]

E1 Channel Parameter Editing

The **[F1] Circuit Identifier** lets you assign a name to the circuit if desired.

The **[F3] Service Mode** setting has two service modes which can select **OOS** (Out of Service) or **IS** (In Service).

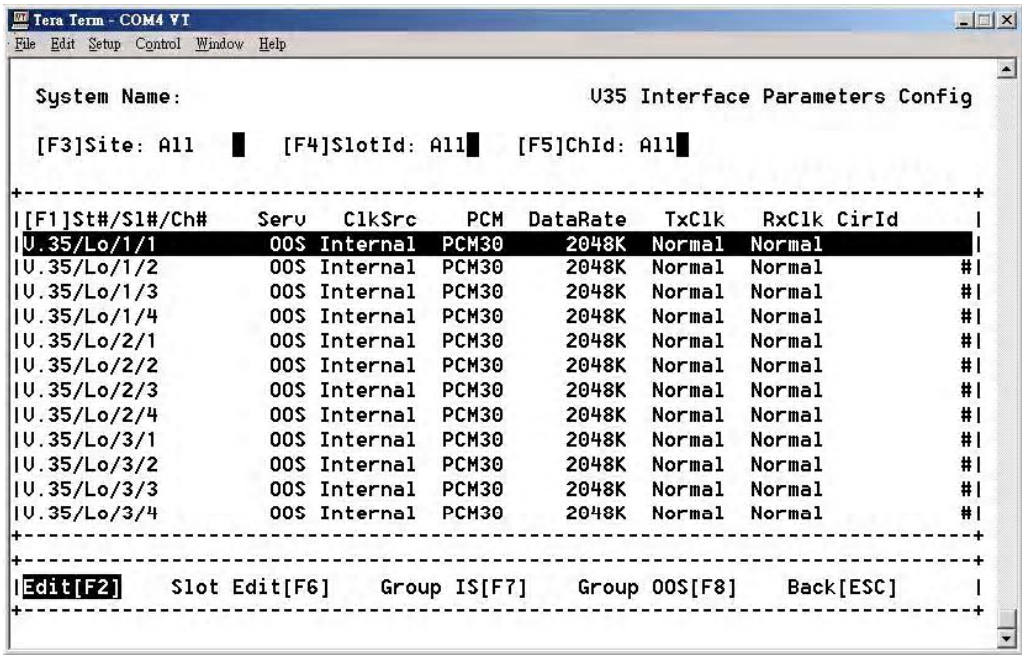
Set the frame type with **[F4] Frame Type**. There are three types of E1 services available: **FAS+CRC**, **FAS Only**, **Unframed**.

Set the line coding with **[F5] Line Coding**. There are two types of E1 line coding: **HDB3** or **AMI**.

Choose **Confirm[F2]** to save the settings.

V.35 Interface Configuration

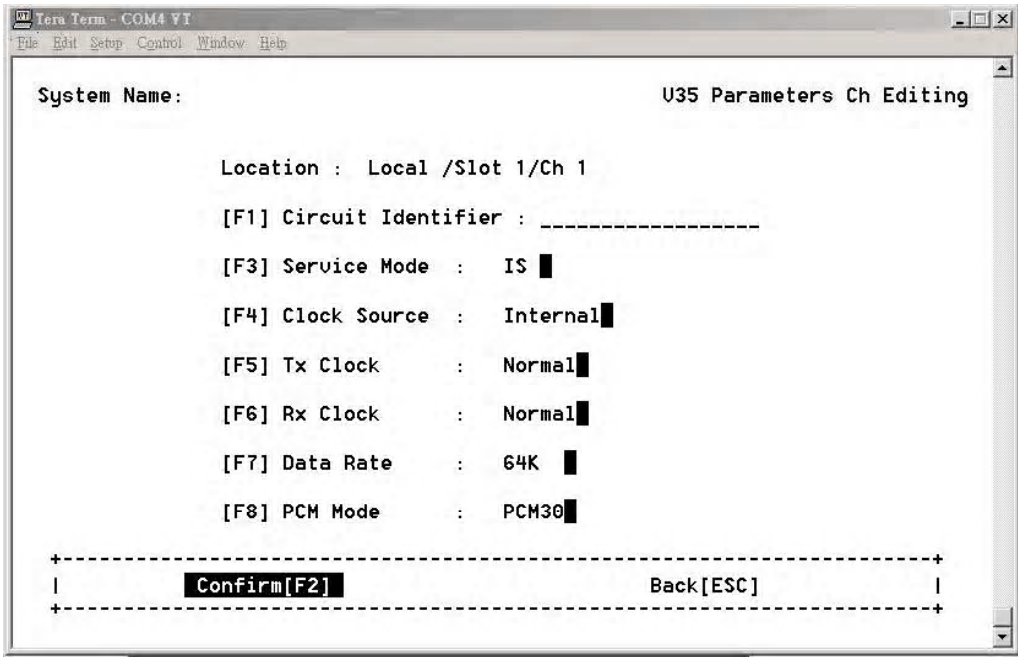
Choose the site, slot and channel as described in the **E1 Configuration** section.


Tera Term - COM4 VT
File Edit Setup Control Window Help
System Name: V35 Interface Parameters Config
[F3]Site: All [F4]SlotId: All [F5]ChId: All
[F1]St#/Sl#/Ch# Serv ClkSrc PCM DataRate TxClk RxClk CirId
V.35/Lo/1/1 OOS Internal PCM30 2048K Normal Normal
V.35/Lo/1/2 OOS Internal PCM30 2048K Normal Normal
V.35/Lo/1/3 OOS Internal PCM30 2048K Normal Normal
V.35/Lo/1/4 OOS Internal PCM30 2048K Normal Normal
V.35/Lo/2/1 OOS Internal PCM30 2048K Normal Normal
V.35/Lo/2/2 OOS Internal PCM30 2048K Normal Normal
V.35/Lo/2/3 OOS Internal PCM30 2048K Normal Normal
V.35/Lo/2/4 OOS Internal PCM30 2048K Normal Normal
V.35/Lo/3/1 OOS Internal PCM30 2048K Normal Normal
V.35/Lo/3/2 OOS Internal PCM30 2048K Normal Normal
V.35/Lo/3/3 OOS Internal PCM30 2048K Normal Normal
V.35/Lo/3/4 OOS Internal PCM30 2048K Normal Normal
Edit[F2] Slot Edit[F6] Group IS[F7] Group OOS[F8] Back[ESC]

V.35 Interface Configuration

Note: If the EOC connection is closed, a symbol "-" will be shown for each configuration.

Choose the **Edit[F2]** to edit channel service types.


Tera Term - COM4 VT
File Edit Setup Control Window Help
System Name: V35 Parameters Ch Editing
Location : Local /Slot 1/Ch 1
[F1] Circuit Identifier : _____
[F3] Service Mode : IS
[F4] Clock Source : Internal
[F5] Tx Clock : Normal
[F6] Rx Clock : Normal
[F7] Data Rate : 64K
[F8] PCM Mode : PCM30
Confirm[F2] Back[ESC]

V.35 Parameters Channel Editing

The **[F1] Circuit Identifier** lets you assign a name to the circuit if desired.

The **[F3] Service Mode** setting has two service modes which can select **OOS** (Out of Service) or **IS** (In Service).

The **[F3] Clock Source** setting permits the use of an **External** clock source, or the **Internal** clock.

You can set the polarity of Tx or Rx clock to fit the requirement of different kind of DTEs.

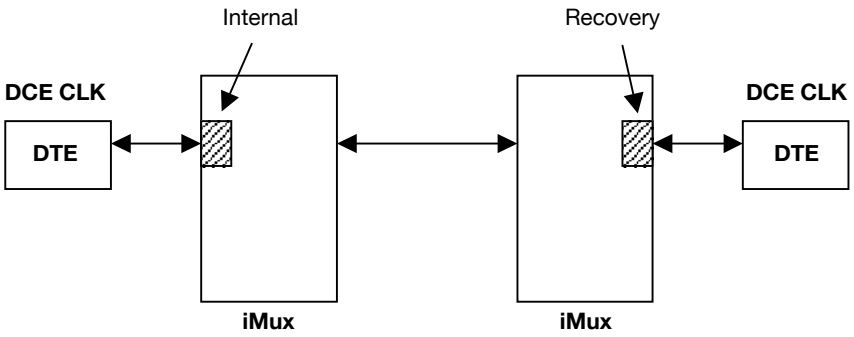
Data Rate

PCM31: 64K~1984K PCM30: 64K~1920K Unframed: 2048K

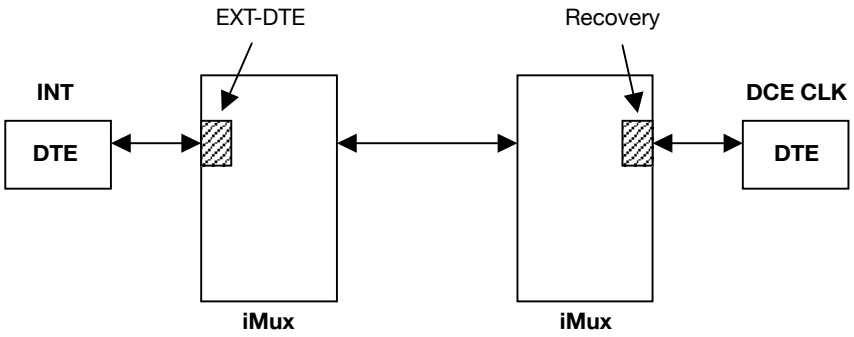
To have stable V.35 configuration performance, you must make sure to set the correct clock mode.

Example clock mode settings:

Example 1

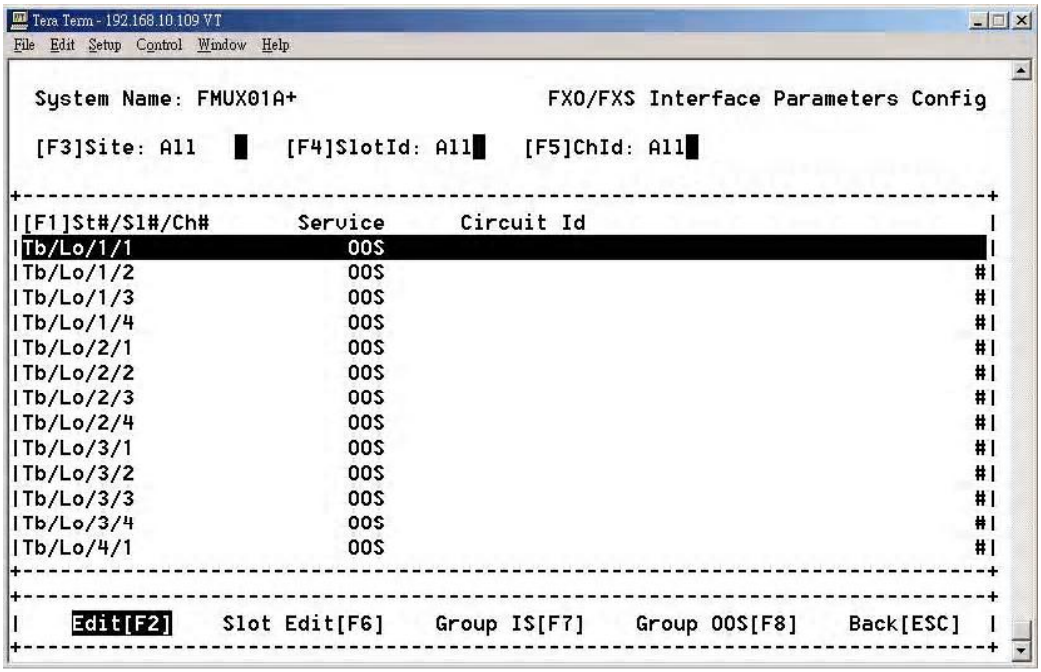


Example 2



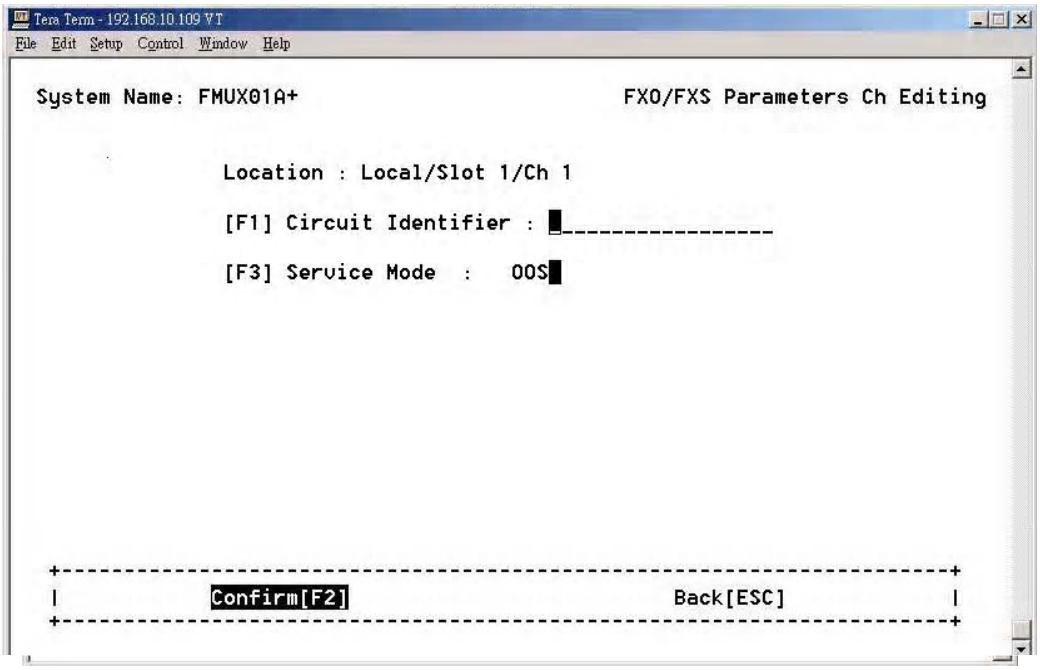
FXO/FXS Interface Configuration

Choose the site, slot and channel as described in the **E1 Configuration** section.



FXO/FXS Interface Parameters Configuration

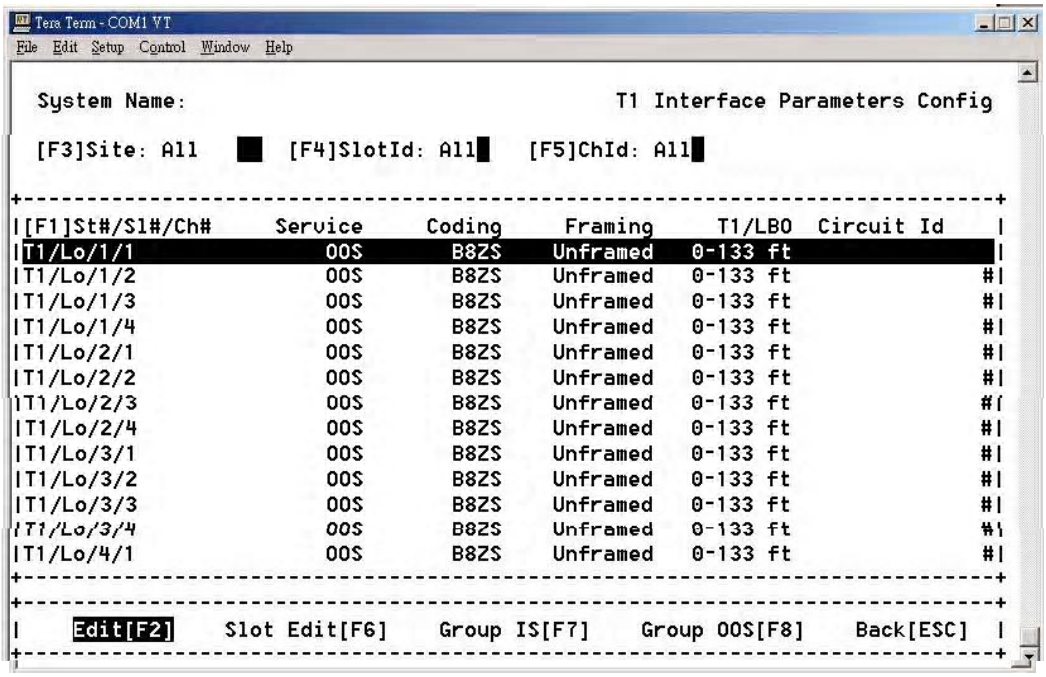
Choose the **`Edit[F2]`** to edit channel service types.


Tera Term - 192.168.10.109 VT
File Edit Setup Control Window Help
System Name: FMUX01A+ FXO/FXS Parameters Ch Editing
Location : Local/Slot 1/Ch 1
[F1] Circuit Identifier :
[F3] Service Mode : OOS
Confirm[F2] Back[ESC]

FXO/FXS Parameters Channel Editing

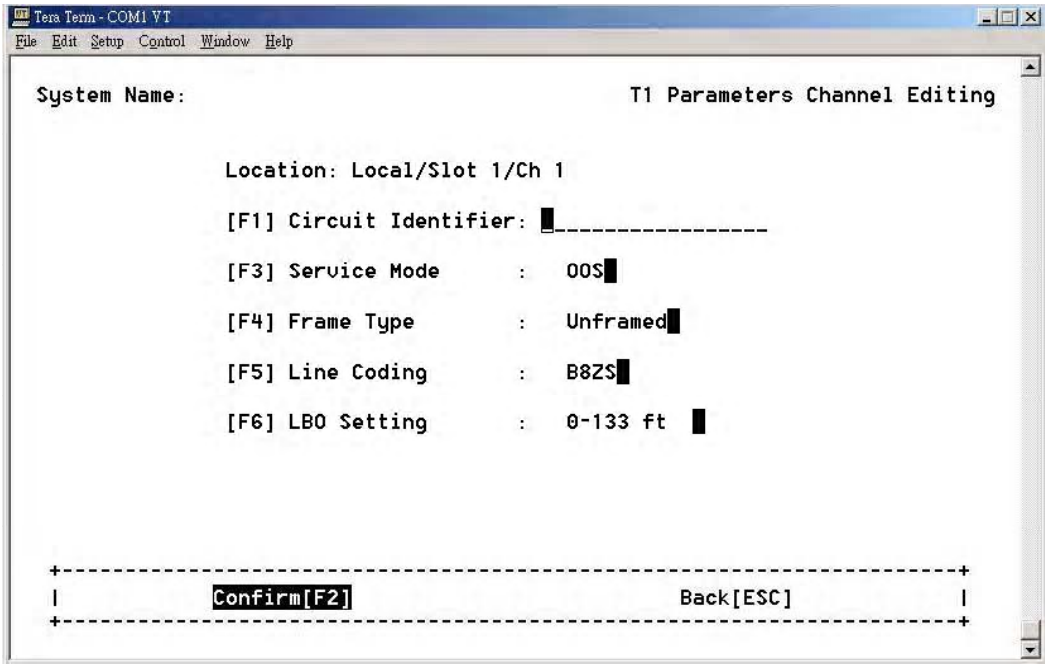
T1 Interface Configuration

Choose the site, slot and channel as described in the **E1 Configuration** section.


Tera Term - COM1 VT
File Edit Setup Control Window Help
System Name: T1 Interface Parameters Config
[F3]Site: All [F4]SlotId: All [F5]ChId: All
[F1]St#/Sl#/Ch# Service Coding Framing T1/LBO Circuit Id
T1/Lo/1/1 OOS B8ZS Unframed 0-133 ft
T1/Lo/1/2 OOS B8ZS Unframed 0-133 ft
T1/Lo/1/3 OOS B8ZS Unframed 0-133 ft
T1/Lo/1/4 OOS B8ZS Unframed 0-133 ft
T1/Lo/2/1 OOS B8ZS Unframed 0-133 ft
T1/Lo/2/2 OOS B8ZS Unframed 0-133 ft
T1/Lo/2/3 OOS B8ZS Unframed 0-133 ft
T1/Lo/2/4 OOS B8ZS Unframed 0-133 ft
T1/Lo/3/1 OOS B8ZS Unframed 0-133 ft
T1/Lo/3/2 OOS B8ZS Unframed 0-133 ft
T1/Lo/3/3 OOS B8ZS Unframed 0-133 ft
T1/Lo/3/4 OOS B8ZS Unframed 0-133 ft
T1/Lo/4/1 OOS B8ZS Unframed 0-133 ft
Edit[F2] Slot Edit[F6] Group IS[F7] Group OOS[F8] Back[ESC]

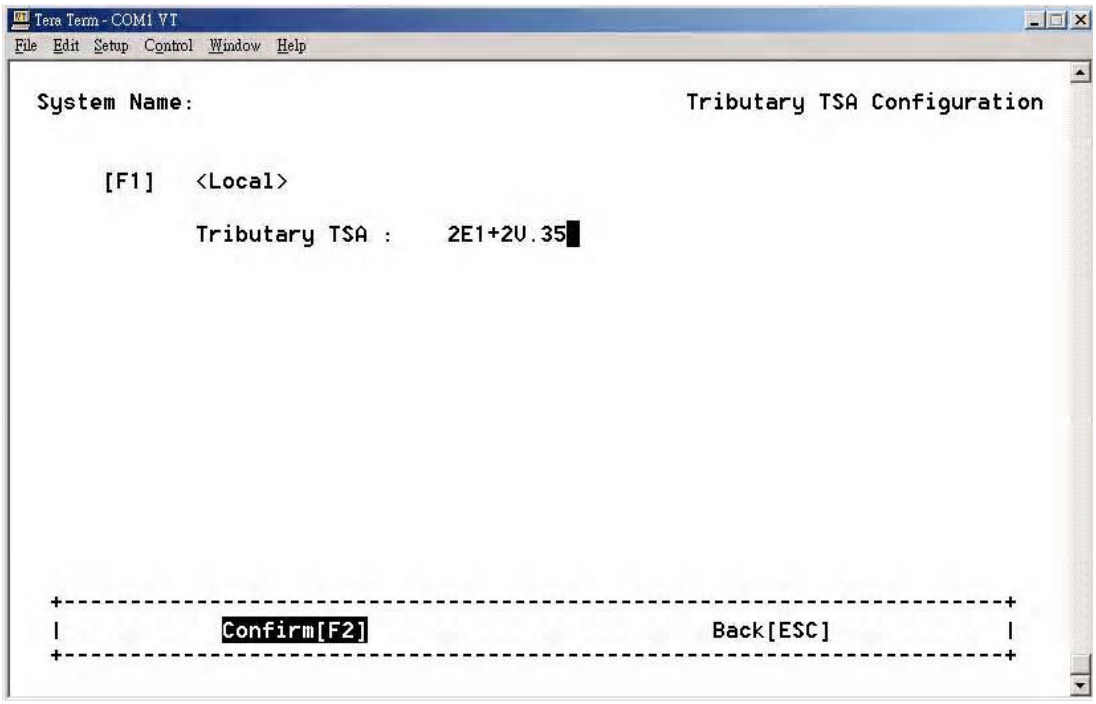
T1 Interface Parameters Configuration

Choose the **`Edit[F2]`** to edit the T1 channel service types.


Tera Term - COM1 VT
File Edit Setup Control Window Help
System Name: T1 Parameters Channel Editing
Location: Local/Slot 1/Ch 1
[F1] Circuit Identifier: _____
[F3] Service Mode : OOS
[F4] Frame Type : Unframed
[F5] Line Coding : B8ZS
[F6] LBO Setting : 0-133 ft
Confirm[F2] Back[ESC]

T1 Interface Parameters Configuration

Tributary TSA configuration



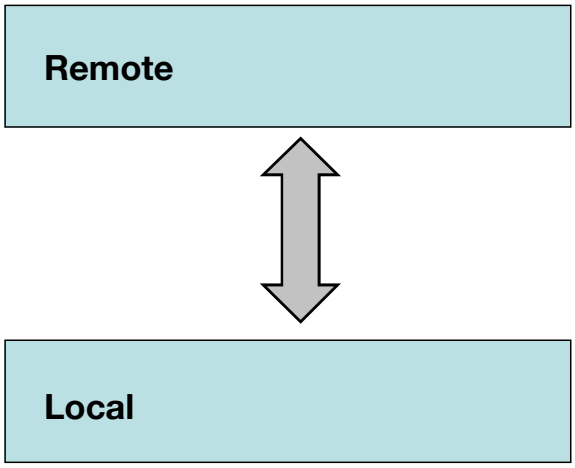
Tributary TSA Configuration Screen

The iMux provides five kinds of the Tributary TSA (Time Slot Assignments) :

- **`Normal`** (All E1 channels)
- **`7E1+1V.35`** (Seven E1 channels and one V.35 channel)
- **`3E1+1V.35`** (Three E1 channels and one V.35 channel)
- **`CH4<->CH5`** (Four E1 channels and one V.35 channel)
- **`CH8<->CH9`** (Eight E1 channels and one V.35 channel)

Note: The V.35 interface setting will be set to **`OOS`** (Out of Service) when **`mode1`**~**`mode4`** is set to the V.35 interface. Be sure to set the V.35 to **`IS`** (In Service) and check the related configuration after the **`mode1`**~**`mode4`** is used.

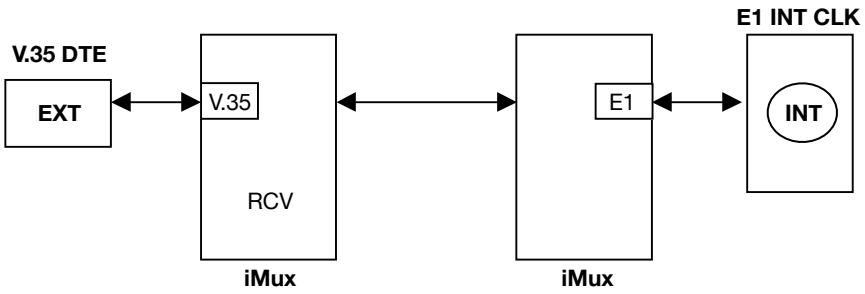
Normal mode (All E1 channels)



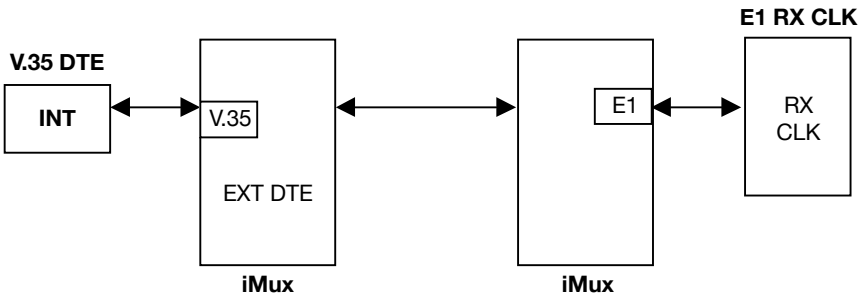
In the normal mode, every channel can also do the PRBS testing with the corresponding channel in the remote side.

Note: The clock setting needs to conform. Refer to the following block diagrams.

1. In this case, the right hand of E1 equipment is set to the internal clock.

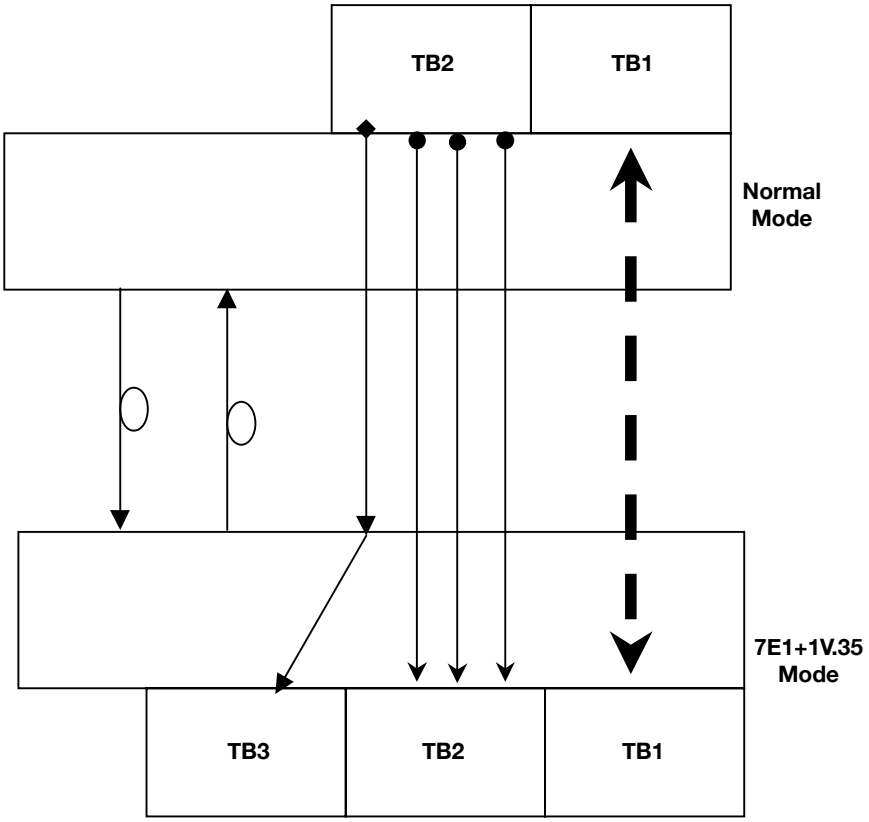


2. In this case, the right hand of E1 equipment is set to receive clock.



Note: When V35 data is connected with E1 data, the related timing clock should be set carefully to get more stable connection.

Seven E1 channels and one V.35 channel mode

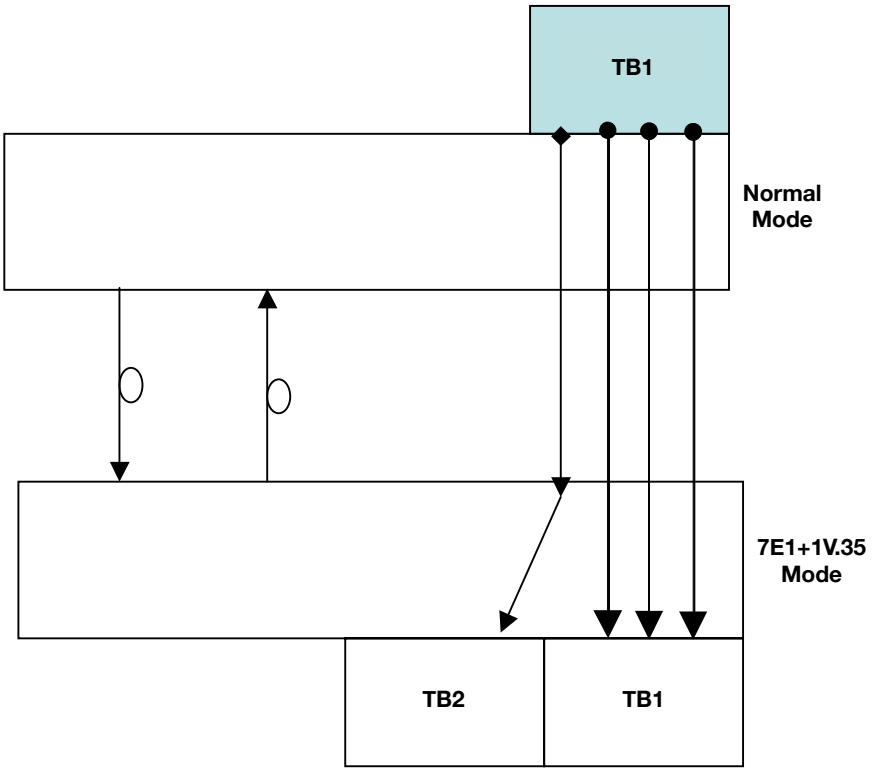


In this mode, user can also do the PRBS test which is like the figure as above. The remote side' channel will generate the test pattern to corresponding channels in the local side.

Remote (4E1 card) Ch1~Ch4 → **Local's** (4E1 card) Ch1~Ch4
Remote (4E1 card) Ch5~Ch7 → **Local's** (4E1 card) Ch5~Ch7
Remote (4E1 card) Ch8 → **Local's** (V35 card)

Note: To avoid unexpected errors, **DO NOT** insert any card in TB2 and TB3 at remote side while the TSA function is **ON**.

Four E1 channels and one V.35 channel mode

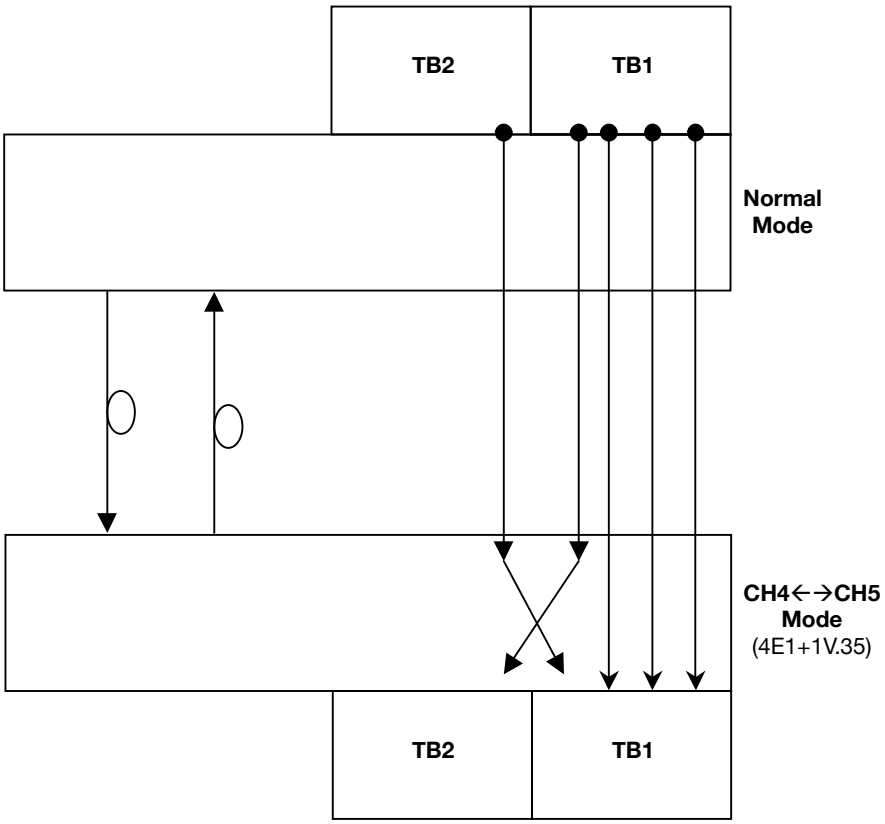


In this mode, the user can also do the PRBS test as reflected in the figure as above. The remote side's channel generates the test pattern to corresponding channels in the local side.

Remote (4E1 card) Ch1 → **Local's** (4E1 card) Ch1
Remote (4E1 card) Ch2 → **Local's** (4E1 card) Ch2
Remote (4E1 card) Ch3 → **Local's** (4E1 card) Ch3
Remote (4E1 card) Ch4 → **Local's** (V35 card)

Note: To avoid unexpected errors, **DO NOT** insert any card in TB2 and TB3 at remote side while TSA function is **ON**.

Eight E1 channels and one V.35 channel mode

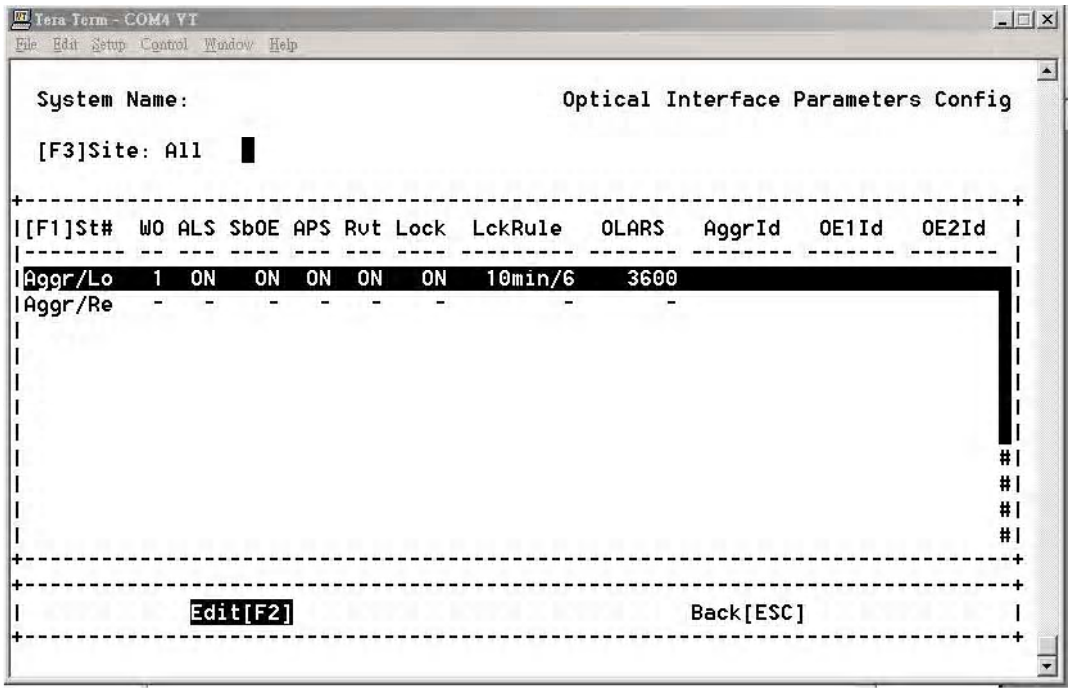


In this mode, user can also do the PRBS test as reflected in the figure as above. The remote side's channel generates the test pattern to corresponding channels in the local side.

Remote (4E1 card) Ch1~Ch3 → **Local's** (4E1 card) Ch1~Ch3
Remote (4E1 card) Ch4 → **Local's** (V35 card) Ch5
Remote (V35 card) Ch5 → **Local's** (4E1 card) Ch4

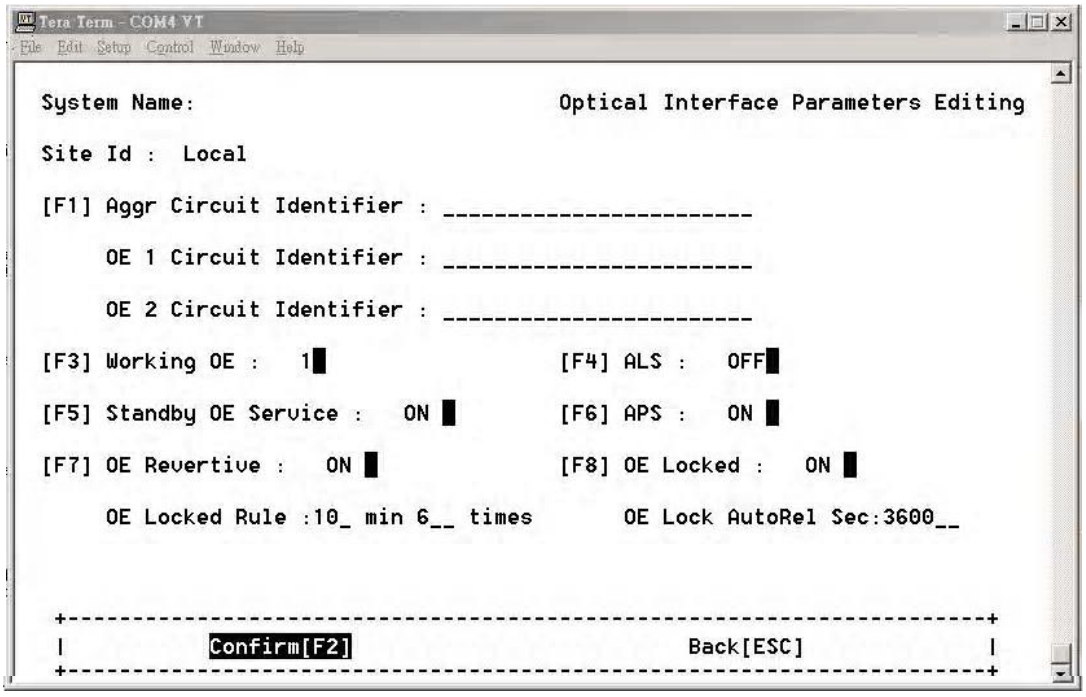
Note: To avoid unexpected errors, **DO NOT** insert any card in TB2 and TB3 at remote side while TSA function is **ON**.

Optical Interface Parameters Configuration


Tera Term - COM4 VT
File Edit Setup Control Window Help
System Name:
Optical Interface Parameters Config
[F3]Site: All
[F1]St# WO ALS SbOE APS Rvt Lock LckRule OLARS AggrId OE1Id OE2Id
Aggr/Lo 1 ON ON ON ON ON 10min/6 3600
Aggr/Re - - - - - - - -
Edit[F2]
Back[ESC]

Optical Interface Parameters Configuration Screen

Select the optical interface to configure and press **`Edit[F2]`** to enter the Edit Channel Screen.


Tera Term - COM4 VT
File Edit Setup Control Window Help
System Name:
Optical Interface Parameters Editing
Site Id : Local
[F1] Aggr Circuit Identifier : _____
OE 1 Circuit Identifier : _____
OE 2 Circuit Identifier : _____
[F3] Working OE : 1
[F4] ALS : OFF
[F5] Standby OE Service : ON
[F6] APS : ON
[F7] OE Revertive : ON
[F8] OE Locked : ON
OE Locked Rule :10_ min 6__ times
OE Lock AutoRel Sec:3600__
Confirm[F2]
Back[ESC]

Optical Interface Parameters Editing Screen

[F1] Aggr Circuit Identifier
OE 1 Circuit Identifier
OE 2 Circuit Identifier
Enter Circuit Identifier names as desired.

[F3] Working OE (Working Optical Enable)
Set the primary working optical interface.

[F4] ALS (Auto Laser Shutdown)
Please refer to the definition of ITU-T G.664, when the iMux detects **LOS** and the **ALS** function is enabled at the same time, then OE will shutdown the signal of Tx. It will detect the signal automatically every 100 seconds. If the alarm of **LOS** isn't cancelled immediately, then it will wait another 100 seconds again. If the **LOS** status is cleared, the system will return to normal state and transmit the laser signal again.

[F5] Standby OE Service (Standby Optical Enable Service)
Enable or disable the Standby Optical Service.

[F6] APS (Auto Protection Switch)
Set the optical auto protection to **ON** or **OFF**. When set to **OFF**, **OeLocked/OeLocked Rule/Oe Lock AutoRel Sec** will not be displayed.

[F7] OE Revertive (Optical Enable Revertive)
When set to **OFF**, **OeLocked/OeLocked Rule/Oe Lock AutoRel Sec** will not be displayed.

[F8] OE Locked (Optical Enable Locked)
Set the optical enable locked to **ON** or **OFF**.

When set to **OFF**, **OeLocked Rule/Oe Lock AutoRel Sec** will not be displayed.

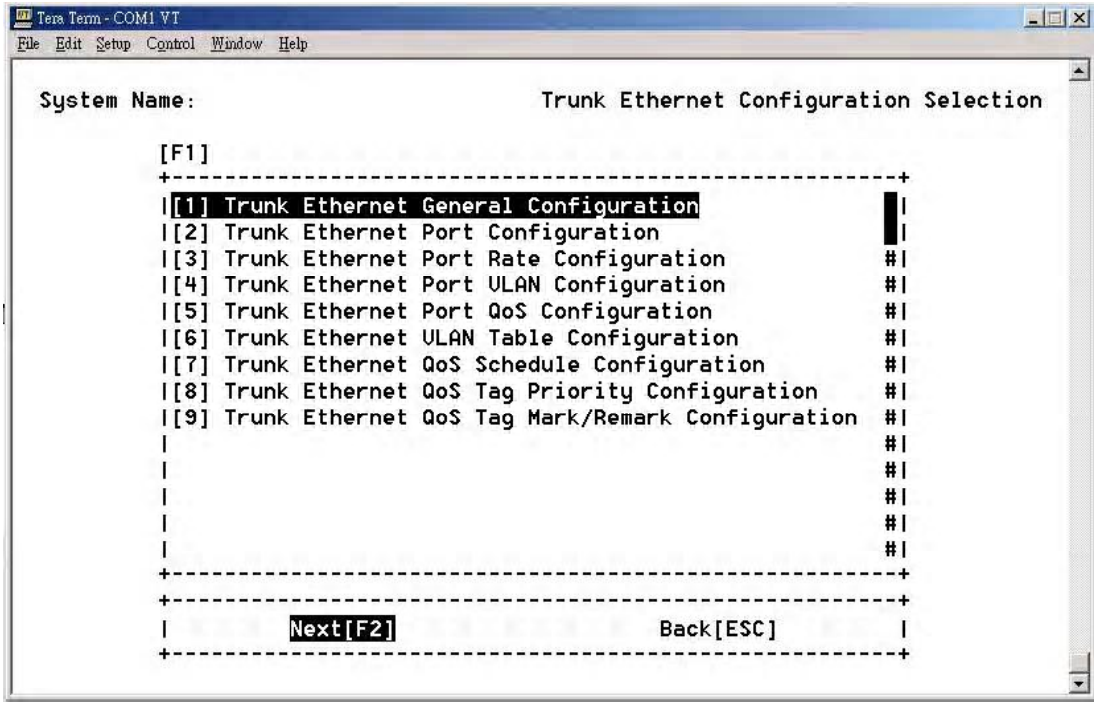
When set to **ON:**

- Locks the optical system according the parameters set in the **OE Locked Rule** settings. Set the time window in minutes, and the number of times. The default setting is 10 minutes, 6 times.
- The **OE Locked AutoRel** (Auto Release) may be set will be auto-release after a user defined duration in seconds. The default setting is 3600 seconds.

Note: If **OE Locked** is **ON**, then it needs to be released on the OE Protection Switching screen.

Note: When any setting is changed that causes the **OeLocked/OeLocked Rule/Oe Lock AutoRel Sec** settings to be no longer displayed, rebooting the system will reload the default values.

Trunk Ethernet Configuration Selection


Tera Term - COM1 VT
File Edit Setup Control Window Help
System Name:
Trunk Ethernet Configuration Selection
[F1]
[1] Trunk Ethernet General Configuration
[2] Trunk Ethernet Port Configuration
[3] Trunk Ethernet Port Rate Configuration
[4] Trunk Ethernet Port VLAN Configuration
[5] Trunk Ethernet Port QoS Configuration
[6] Trunk Ethernet VLAN Table Configuration
[7] Trunk Ethernet QoS Schedule Configuration
[8] Trunk Ethernet QoS Tag Priority Configuration
[9] Trunk Ethernet QoS Tag Mark/Remark Configuration
Next[F2]
Back[ESC]

Trunk Ethernet Configuration Screen

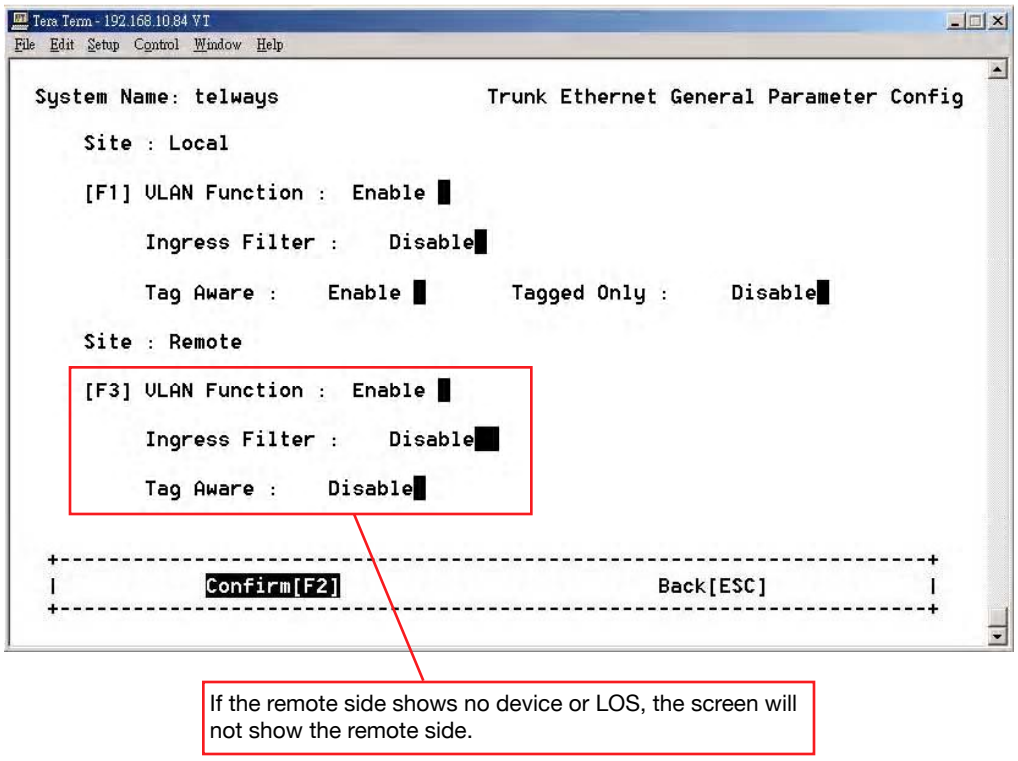
This screen allows you to easily change port functions including the fast Ethernet rate configuration in the Ethernet interface, QoS settings and VLAN configuration.

The Trunk Ethernet Configuration menu includes:

[1] Trunk Ethernet General Configuration
[2] Trunk Ethernet Port Configuration
[3] Trunk Ethernet Port Rate Configuration
[4] Trunk Ethernet Port VLAN Configuration
[5] Trunk Ethernet Port QoS Configuration
[6] Trunk Ethernet VLAN Table Configuration
[7] Trunk Ethernet QoS Schedule Configuration
[8] Trunk Ethernet QoS Tag Priority Configuration
[9] Trunk Ethernet QoS Tag Mark/Remark Configuration

Note: VLAN is enabled or disabled using the **[1] Trunk Ethernet General Configuration** menu. VLAN is configured using configuration screens **[4] Trunk Ethernet Port VLAN Configuration** and **[6] Trunk Ethernet VLAN Table Configuration** menus. These two screens follow each other in this User Guide for clarity.

Trunk Ethernet General Parameter Config


Tera Term - 192.168.10.84 VT
File Edit Setup Control Window Help
System Name: telways Trunk Ethernet General Parameter Config
Site : Local
[F1] VLAN Function : Enable
Ingress Filter : Disable
Tag Aware : Enable
Tagged Only : Disable
Site : Remote
[F3] VLAN Function : Enable
Ingress Filter : Disable
Tag Aware : Disable
Confirm[F2]
Back[ESC]
If the remote side shows no device or LOS, the screen will not show the remote side.

Trunk Ethernet General Configuration Screen

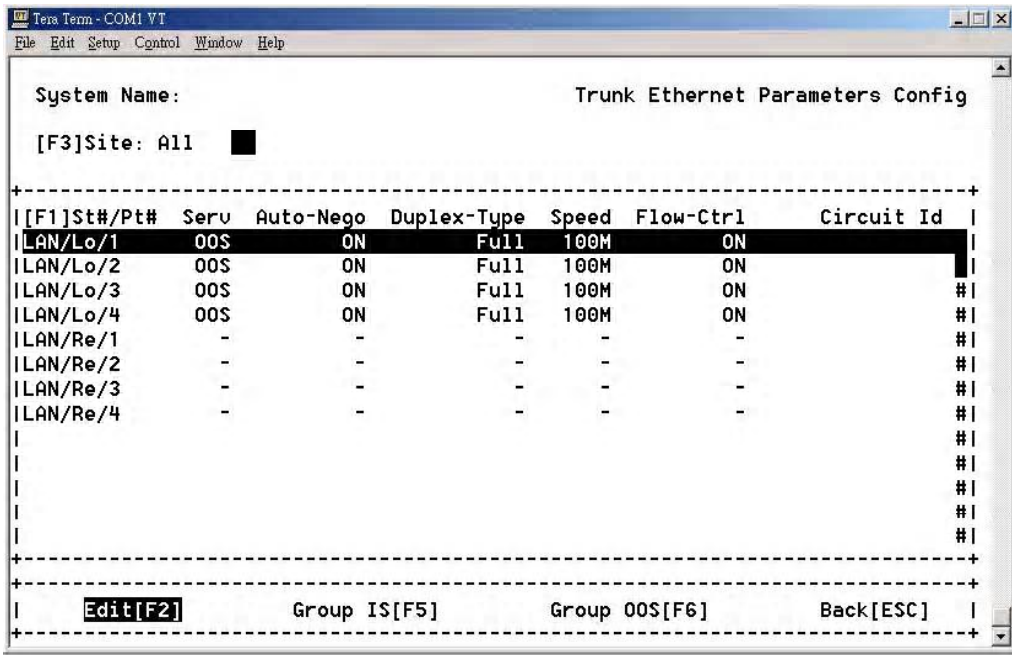
Set the **[F1] VLAN function** as desired.

VLAN Function

Mode	Setting	Description
Ingress Filter	**Enable**	Drop frame associated with a VLAN for which that port is not in the member set.
	Disable	Disable ingress filtering.
Tag Aware	**Enable**	Tagged-based.
	Disable	Port-based
Tag Only	**Enable**	Only accepts tagged frames and drop untagged ones.
	Disable	Accepts tagged and untagged frames.

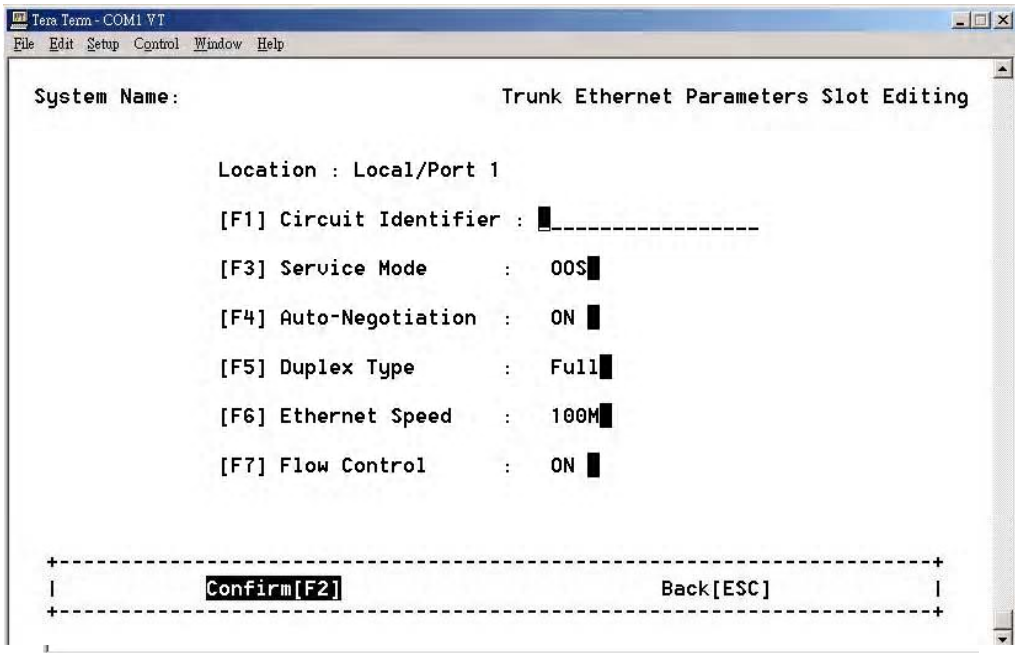
Note: Refer to page 65, **Trunk Ethernet Port VLAN Config**, to configure the VLAN functions.

Trunk Ethernet Parameters Config


Tera Term - COM1 VT
File Edit Setup Control Window Help
System Name:
Trunk Ethernet Parameters Config
[F3]Site: All
[F1]St#/Pt# Serv Auto-Nego Duplex-Type Speed Flow-Ctrl Circuit Id
LAN/Lo/1 OOS ON Full 100M ON
LAN/Lo/2 OOS ON Full 100M ON
LAN/Lo/3 OOS ON Full 100M ON
LAN/Lo/4 OOS ON Full 100M ON
LAN/Re/1 - - - - -
LAN/Re/2 - - - - -
LAN/Re/3 - - - - -
LAN/Re/4 - - - - -
Edit[F2]
Group IS[F5]
Group OOS[F6]
Back[ESC]

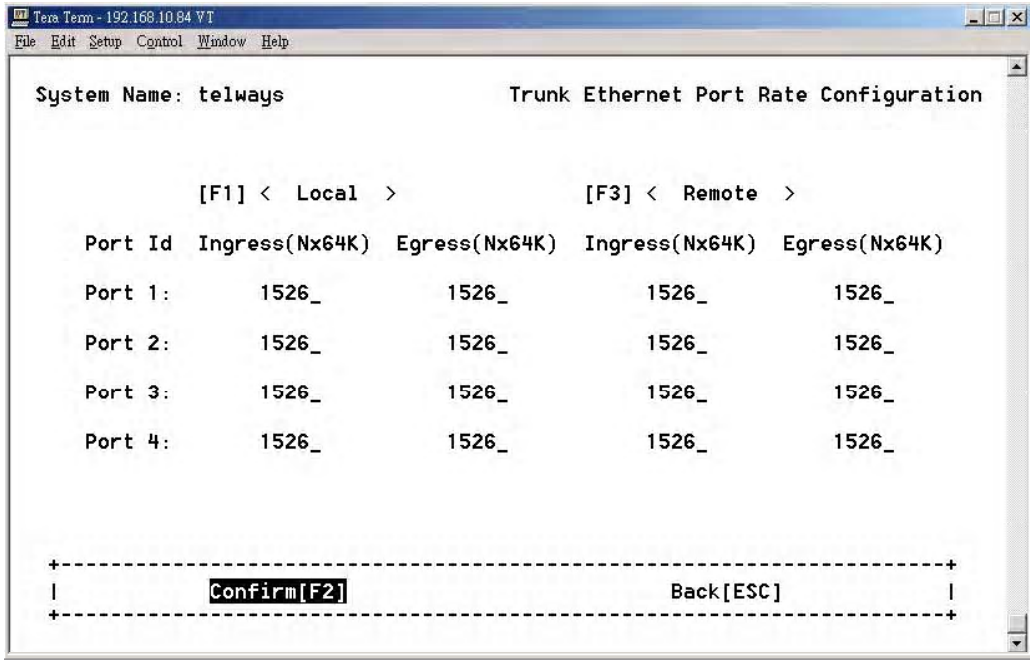
Trunk Ethernet Parameters Configuration

Set the local and remote ports as desired.


Tera Term - COM1 VT
File Edit Setup Control Window Help
System Name:
Trunk Ethernet Parameters Slot Editing
Location : Local/Port 1
[F1] Circuit Identifier :
[F3] Service Mode : OOS
[F4] Auto-Negotiation : ON
[F5] Duplex Type : Full
[F6] Ethernet Speed : 100M
[F7] Flow Control : ON
Confirm[F2]
Back[ESC]

Trunk Ethernet Parameters Configuration Slot Editing

Trunk Ethernet Port Rate Configuration

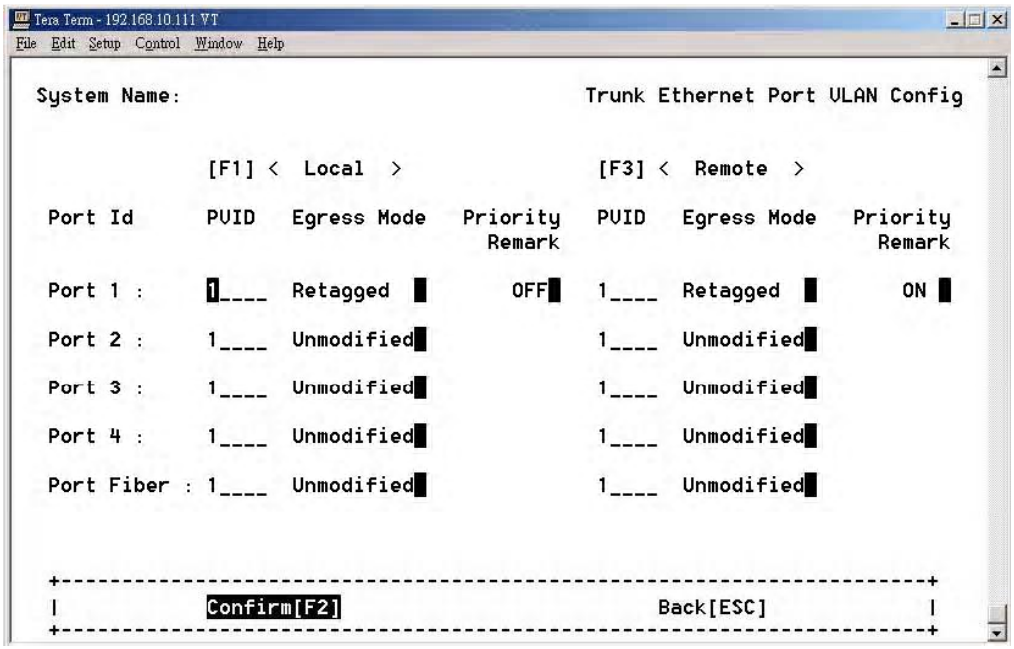

Tera Term - 192.168.10.84 VT
File Edit Setup Control Window Help
System Name: telways
Trunk Ethernet Port Rate Configuration
[F1] < Local >
[F3] < Remote >
Port Id Ingress(Nx64K) Egress(Nx64K) Ingress(Nx64K) Egress(Nx64K)
Port 1: 1526_ 1526_ 1526_ 1526_
Port 2: 1526_ 1526_ 1526_ 1526_
Port 3: 1526_ 1526_ 1526_ 1526_
Port 4: 1526_ 1526_ 1526_ 1526_
Confirm[F2]
Back[ESC]

Trunk Ethernet Port Rate Configuration

You may change the Fast Ethernet port speed to another port speed. Each port may be set individually by setting the ingress and egress speed to desired speed. This setting may be extended to cover multiple network ports or limited to just either ingress or egress if needed.

- **1526** = 100M
- **152** = 10M
- **Ingress** = RX
- **Egress** = TX

Trunk Ethernet Port VLAN Config



Trunk Ethernet VLAN Config Screen

Begin setting up the VLAN configuration by using this menu.

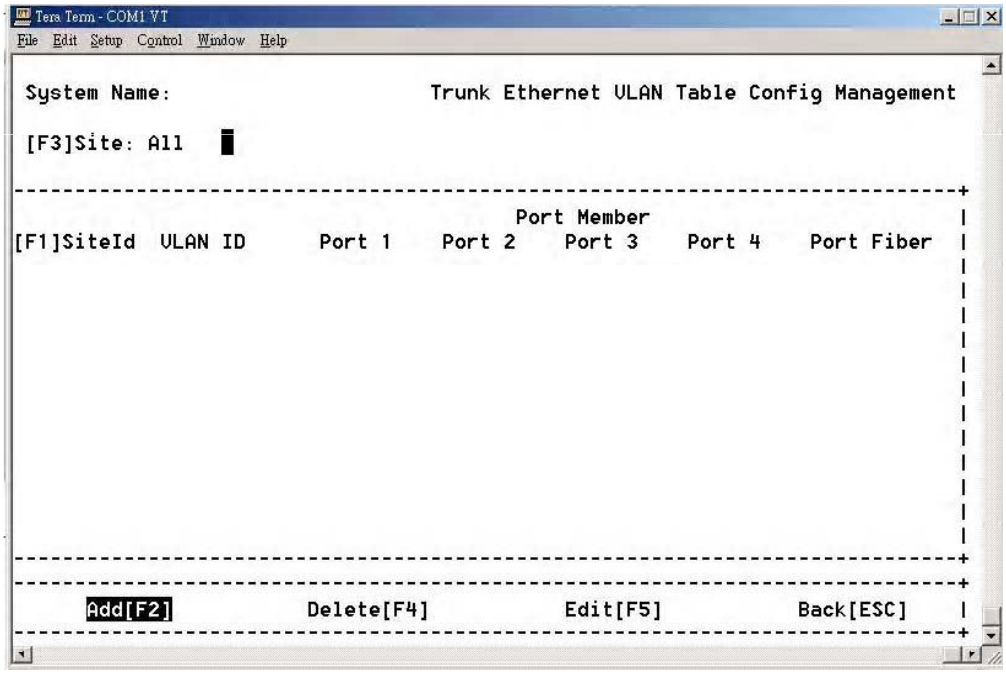
Note: The **PVID** (Port VLAN ID) must be between 1 and 4094. The **PVID** number set in this menu must also be used for the same port in the **Trunk Ethernet VLAN Configuration** screen.

Egress Mode

Mode	Description
Unmodified	Do not insert or remove VLAN tag to/from packets sent out from this port.
Untagged	If tagged packets are received, the switch will remove VLAN tag from packets
Tagged	If untagged packets are received, the switch will add Ingress PVID. And do nothing when switch receive any tagged packets
Retagged	If tagged packets received, switch will remove VLAN tags than add new tags as PVID. It is a replacement processing for tagged packets and insertion for untagged packets

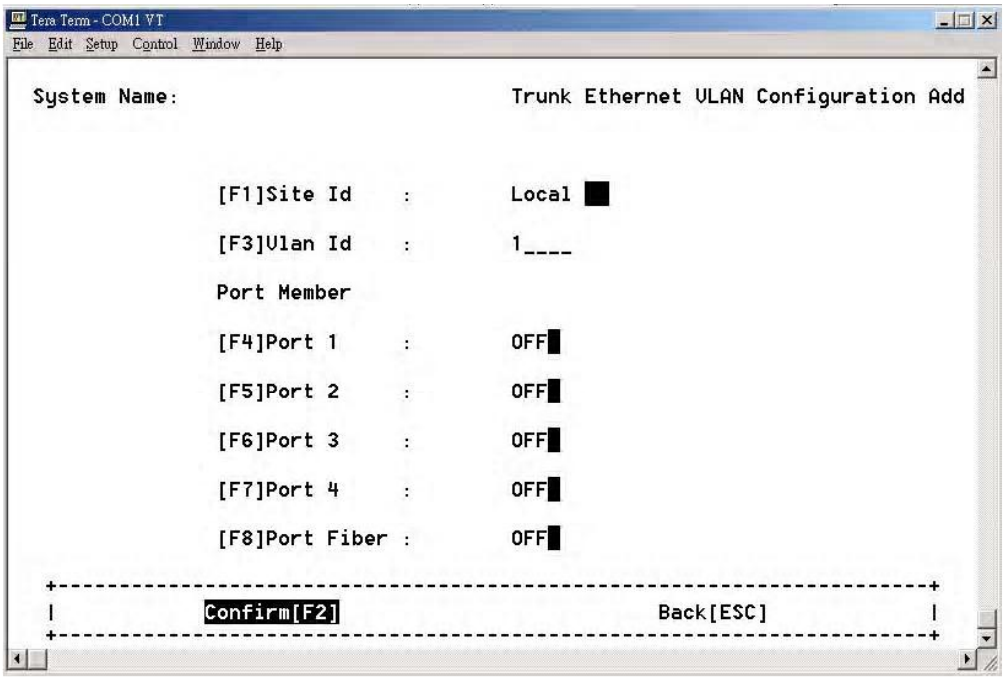
After confirming the changes by selecting **Confirm [F2]**, select **[6] Trunk Ethernet VLAN Table Configuration** from the **Trunk Ethernet Configuration Selection** main menu to continue configuring VLAN.

Trunk Ethernet VLAN Table Config Management



Trunk Ethernet VLAN Table Config Screen

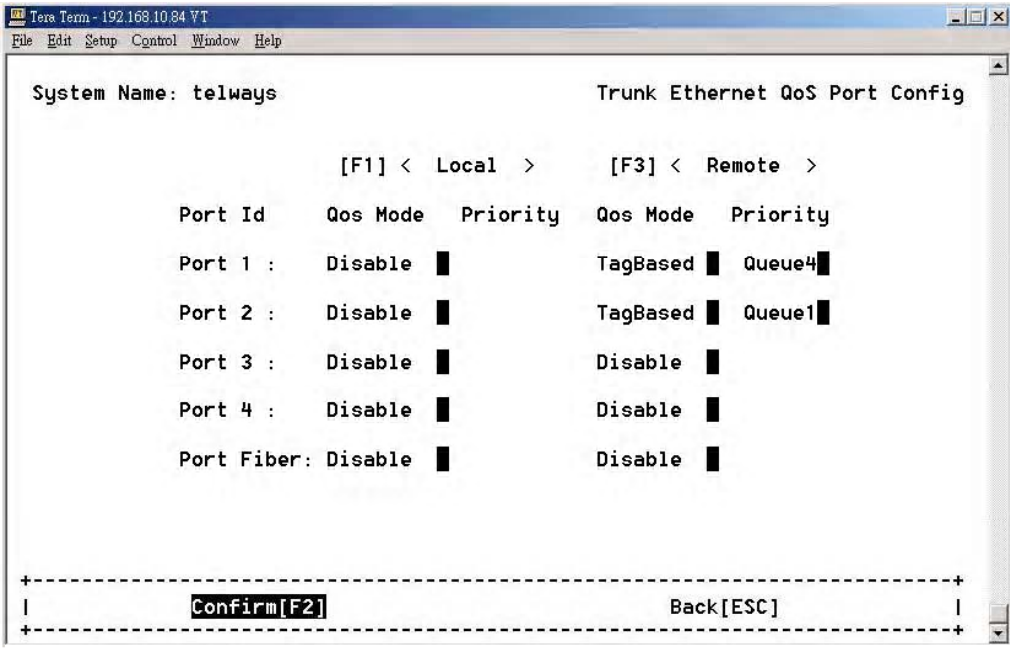
Select `Add[F2]` to add a VLAN configuration to the table.



Trunk Ethernet VLAN Configuration Add

Specify the **`VLAN Id`** and its associated port member using the same **`VLAN Id`** entered in the **`Trunk Ethernet Port VLAN Config`** screen. Select **`Confirm[F2]`** to add the configuration to the table.

Trunk Ethernet QoS Port Config



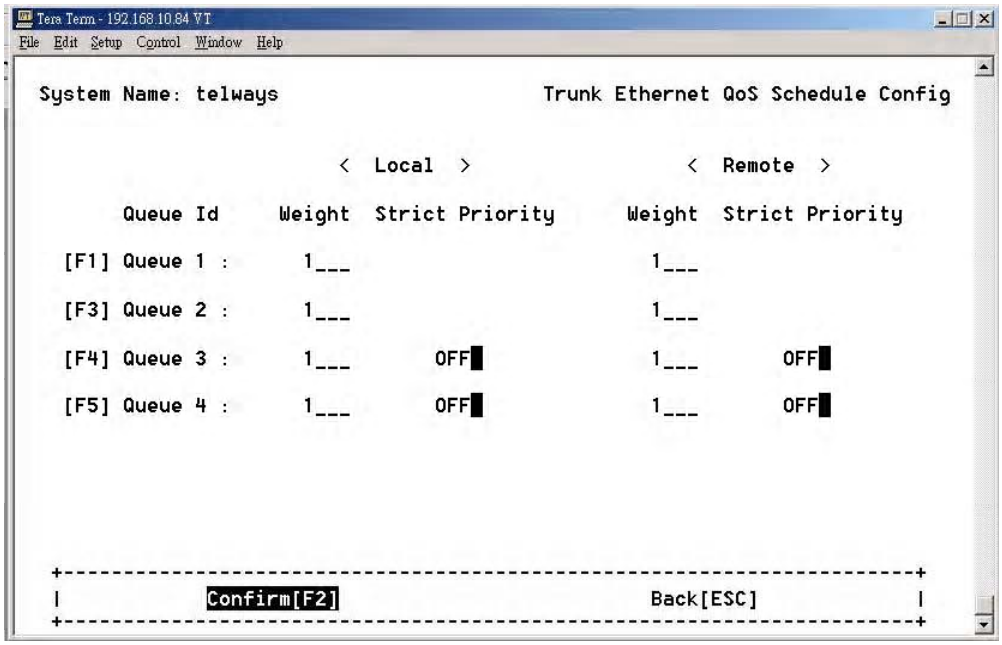
Trunk Ethernet QoS Port Config Screen

This screen specifies the QoS configuration for every trunk ethernet port.

QoS Mode

Mode	Description
Disable	Turn off the QoS function for this port
PortBased	Turn on the the QoS function, and the priority of each packet received from this port is assigned by the following [Priority] setting. There are four priority levels, Queue1, Queue2, Queue3, and Queue4.
Tagged	In this mode, when a packet is VLAN-tagged or priority-tagged, the priority is specified by the 3-bit tag. When a packet is untagged, its priority is assigned by the following [Priority] setting.

Trunk Ethernet QoS Schedule Config



Trunk Ethernet VLAN QoS Schedule Config Screen

This screen specifies the the packet egress scheduling configuration when QoS support is enabled.

The packet scheduling is weighted round robin (WRR), the setting [Weight] is applied to the four queues.

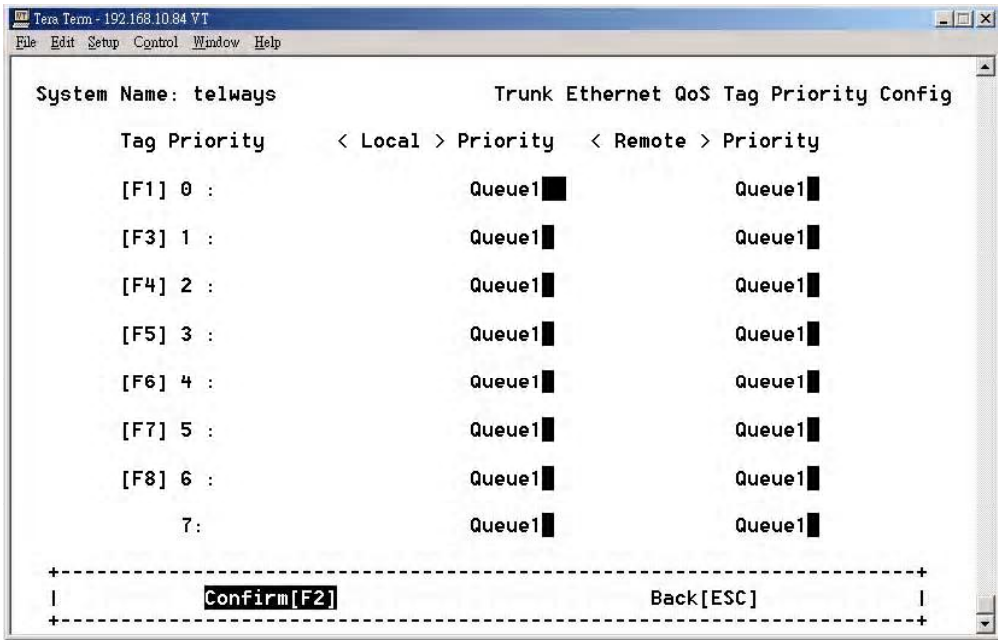
This approach prevents the lower priority frames from being starved out with only a slightly increased delay to the higher priority packets, and guarantee the minimal packet rate of one queue.

The range of weight for each port is between 1 and 127. For Queue3 and Queue4, the strict priority scheduling is supported.

If there is strict priority (only in Q2 and Q3) and WRR at the same time, the queue with strict priority has higher priority than WRR. When the scheduler scans queues, queues with strict priority are scanned first, and than the other queues are scanned according to WRR.

If there is more one queue with strict priority, the queue with the bigger queue ID has higher priority.

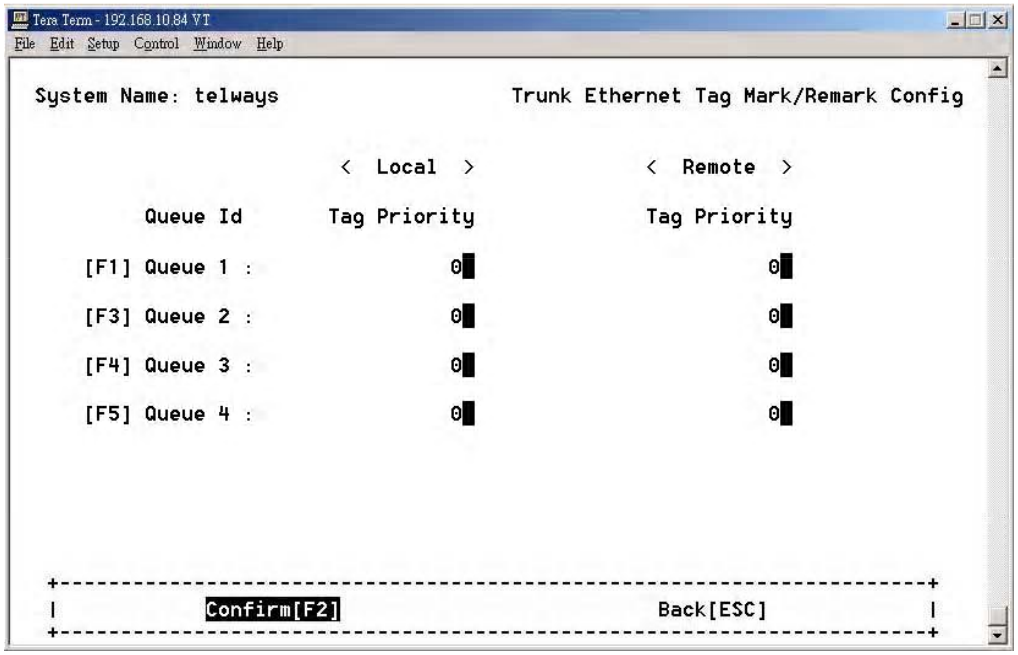
Trunk Ethernet QoS Tag Priority Config



Trunk Ethernet QoS Tag Priority Config Screen

Specifies the mapping of 3-bit tag priority to the four level priority, Queue1 ~ Queue4.

Trunk Ethernet Tag Mark/Remark Config



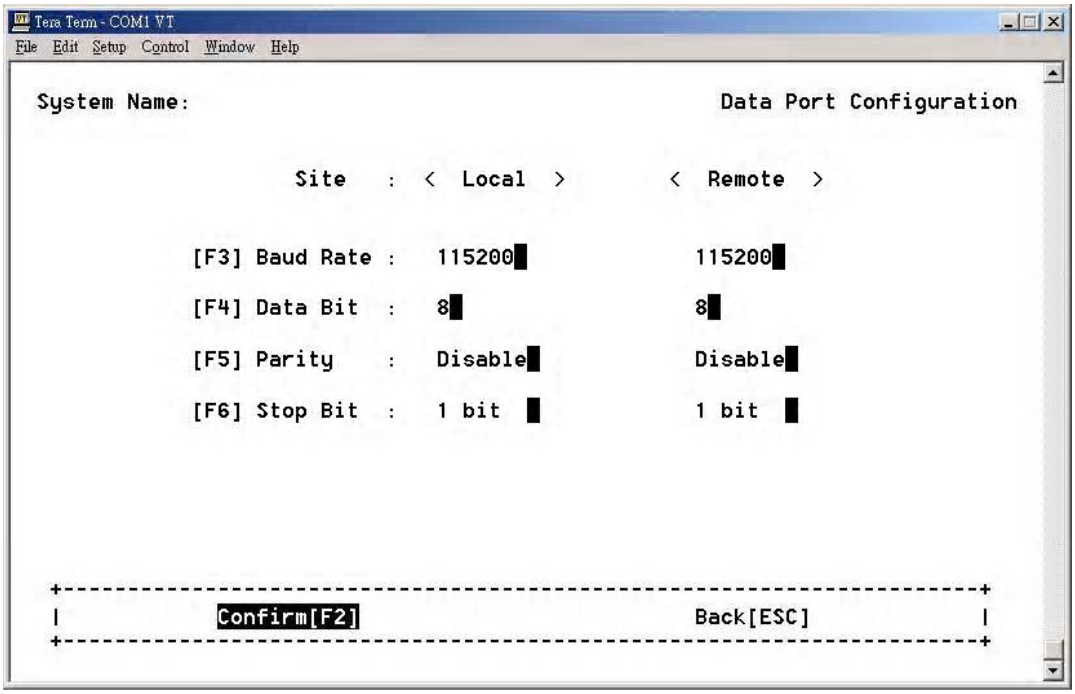
Trunk Ethernet QoS Tag Mark/Remark Config Screen

Specifies the remarking mapping for tagged and retagged packets.

When the VLAN tags are entered as non-tagged packets, the 3-bit priority of the inserted tag will follow this configuration.

When the Egress Mode setting is Retagged and the TagRemark setting is turned ON, the priority field of of the VLAN tag is replaced with this tag priority of the assigned queue.

Data Port Parameters Configuration

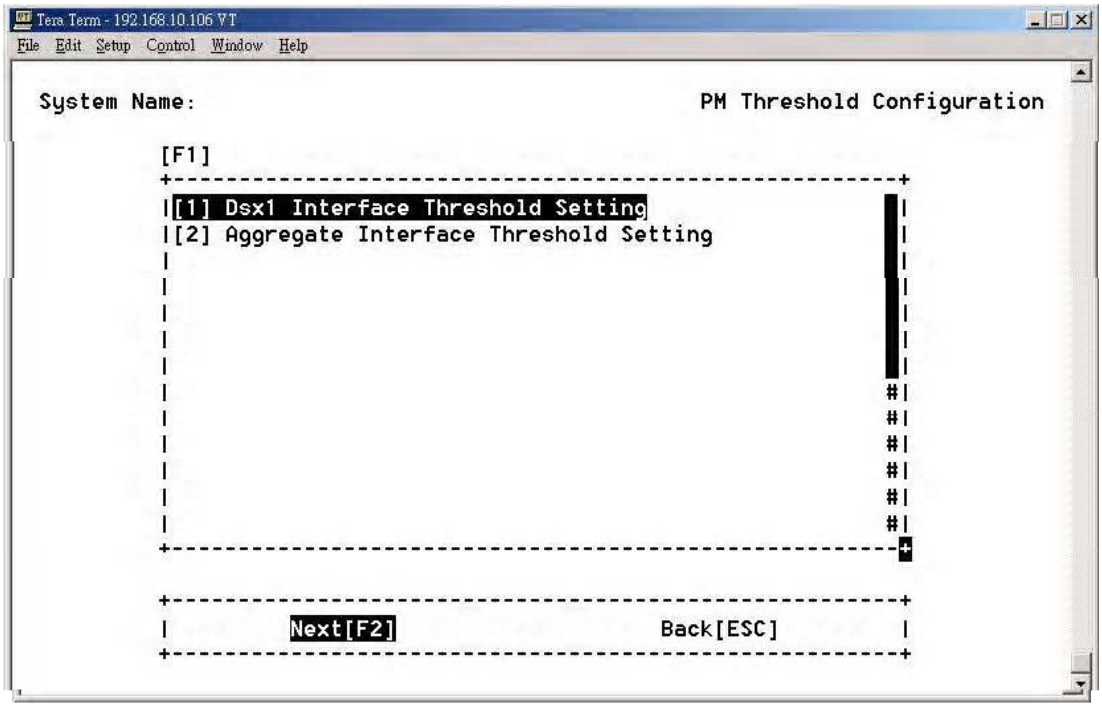

Tera Term - COM1 VT
File Edit Setup Control Window Help
System Name:
Data Port Configuration
Site : < Local > < Remote >
[F3] Baud Rate : 115200 115200
[F4] Data Bit : 8 8
[F5] Parity : Disable Disable
[F6] Stop Bit : 1 bit 1 bit
Confirm[F2]
Back[ESC]

Data Port Configuration Screen

In this screen you may configure different data rates for transmitting and receiving data.

Performance Management Threshold Configuration

PM Threshold Configuration



PM Threshold Configuration Screen

The Performance Management setting allows you set a PM threshold value. If the PM value is equal or over the threshold's value then it will issue the TCA alarm.

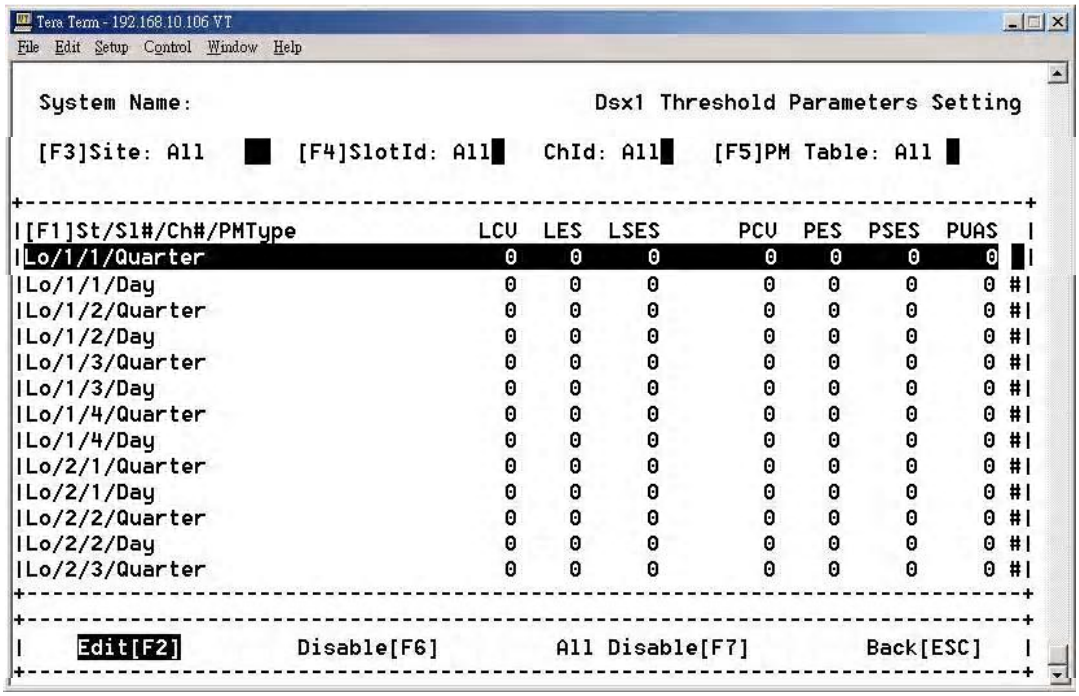
If TCA alarm is enabled, the alarm of TCA will be released after it's min/day setting.

If the value is " 0 " the TCA will be disabled.

Threshold Settings

Setting	Description
[1] Dsx1 Interface Threshold Setting	Electrical interface threshold setting.
[2] Aggregate Interface Threshold Setting	Optical interface threshold setting.

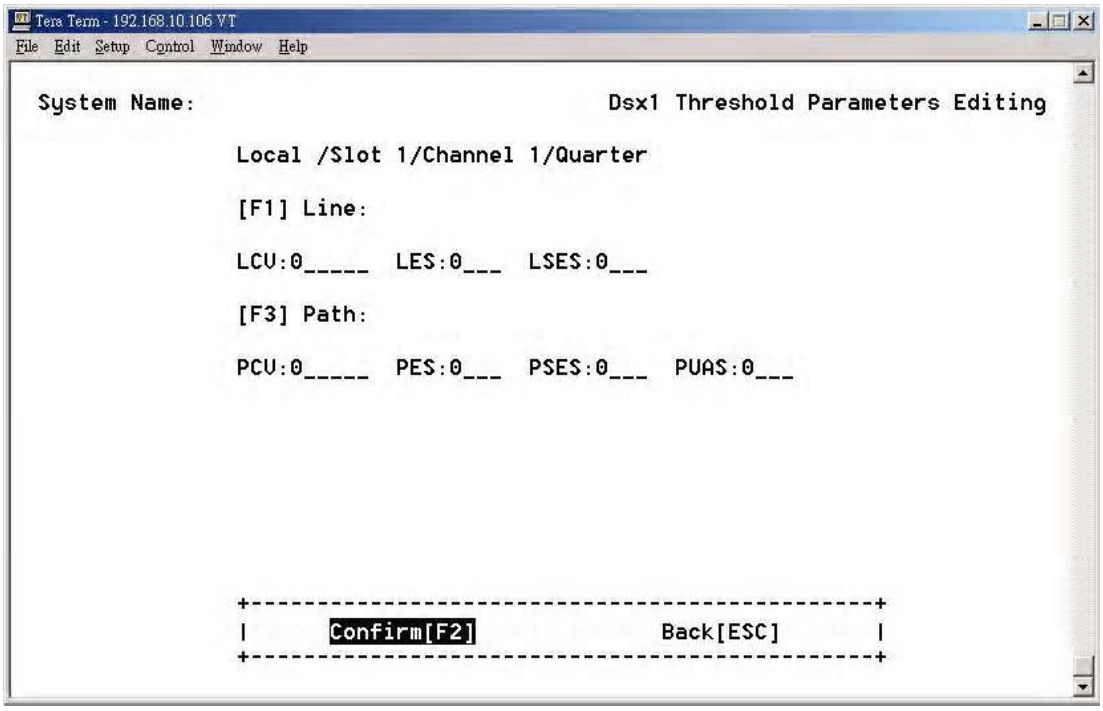
Dsx1 Interface Threshold Setting


Tera Term - 192.168.10.106 VT
File Edit Setup Control Window Help
System Name: Dsx1 Threshold Parameters Setting
[F3]Site: All [F4]SlotId: All ChId: All [F5]PM Table: All
[F1]St/Sl#/Ch#/PMType LCV LES LSES PCV PES PSES PUAS
Lo/1/1/Quarter 0 0 0 0 0 0 0
Lo/1/1/Day 0 0 0 0 0 0 0
Lo/1/2/Quarter 0 0 0 0 0 0 0
Lo/1/2/Day 0 0 0 0 0 0 0
Lo/1/3/Quarter 0 0 0 0 0 0 0
Lo/1/3/Day 0 0 0 0 0 0 0
Lo/1/4/Quarter 0 0 0 0 0 0 0
Lo/1/4/Day 0 0 0 0 0 0 0
Lo/2/1/Quarter 0 0 0 0 0 0 0
Lo/2/1/Day 0 0 0 0 0 0 0
Lo/2/2/Quarter 0 0 0 0 0 0 0
Lo/2/2/Day 0 0 0 0 0 0 0
Lo/2/3/Quarter 0 0 0 0 0 0 0
Edit[F2] Disable[F6] All Disable[F7] Back[ESC]

Dsx1 Threshold Parameters Setting

You may use the function keys to modify the selected traffic link. There are two PM types: the **`Quarter`** (15 minutes), the **`Day`** (24 hours).

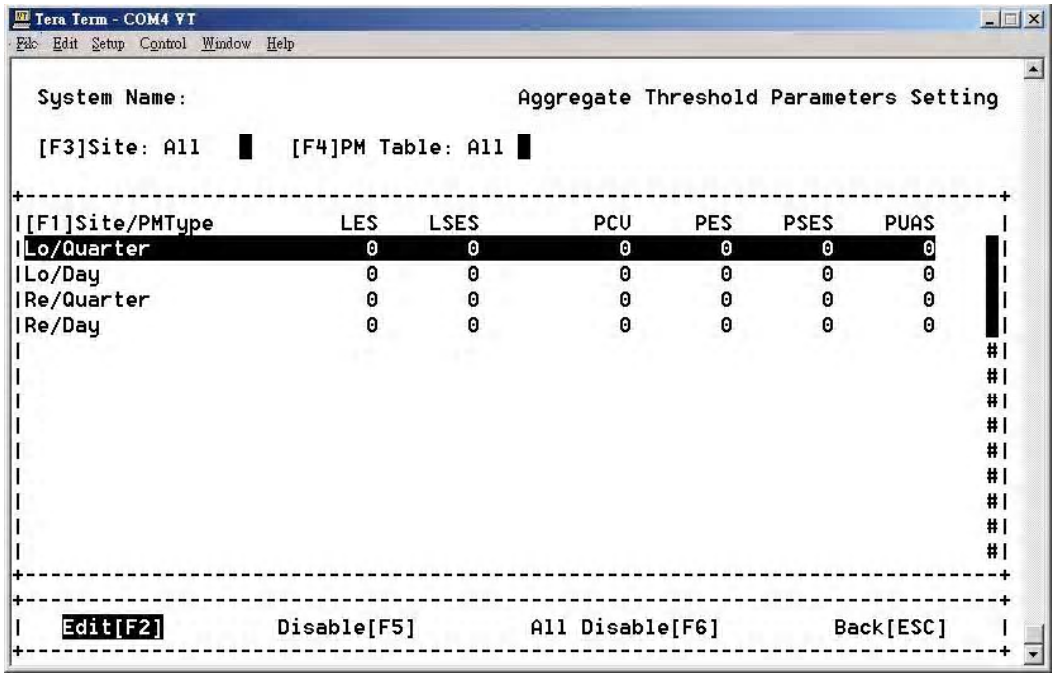
Function Key	Description
`[F6] Disable`	Disable the PM TCA alarm on the selected E1 path by high light bar
`[F7] All Disable`	Disable the PM TCA alarm on the all selected E1 paths by the selection filters



Dsx1 Threshold Parameters Editing Screen

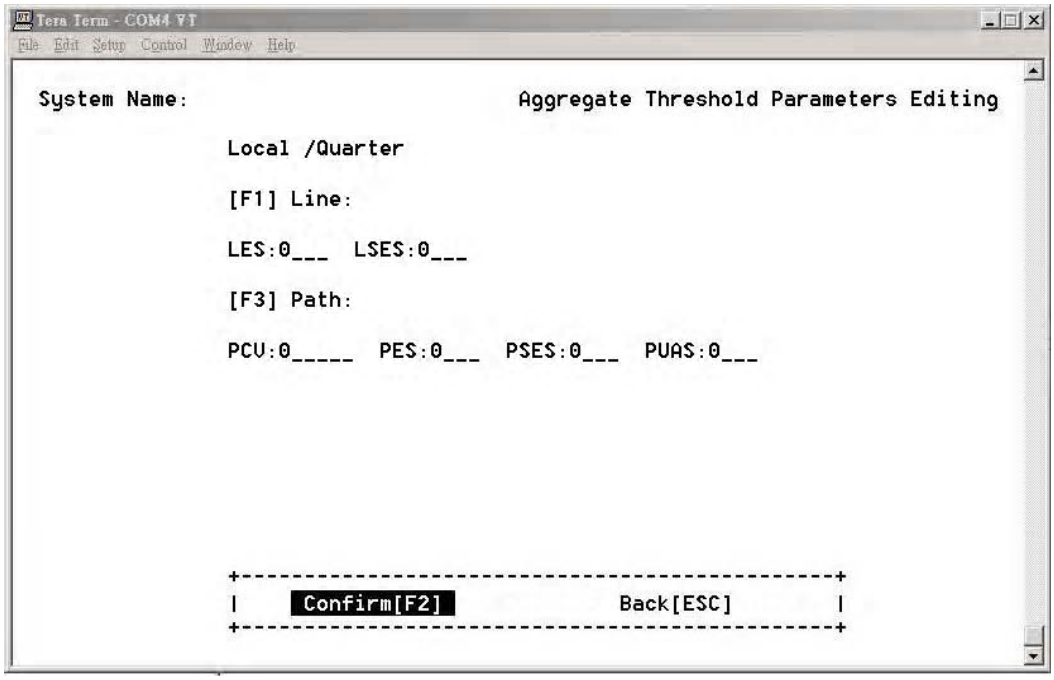
Function Key	Setting	Description
[F1] Line	**LCV:**	Line Code Violation
	LES:	Line Error Second
	LSES:	Line Several Error Second
[F3] Path	**PCV:**	Path Code Violation
	PES:	Path Error Second
	PSES:	Path Several Error Second

Aggregate Interface Threshold Setting


Tera Term - COM4 VT
File Edit Setup Control Window Help
System Name:
Aggregate Threshold Parameters Setting
[F3]Site: All
[F4]PM Table: All
[F1]Site/PMType LES LSES PCU PES PSES PUAS
Lo/Quarter 0 0 0 0 0 0
Lo/Day 0 0 0 0 0 0
Re/Quarter 0 0 0 0 0 0
Re/Day 0 0 0 0 0 0
Edit[F2]
Disable[F5]
All Disable[F6]
Back[ESC]

Aggregate Threshold Parameters Setting Screen

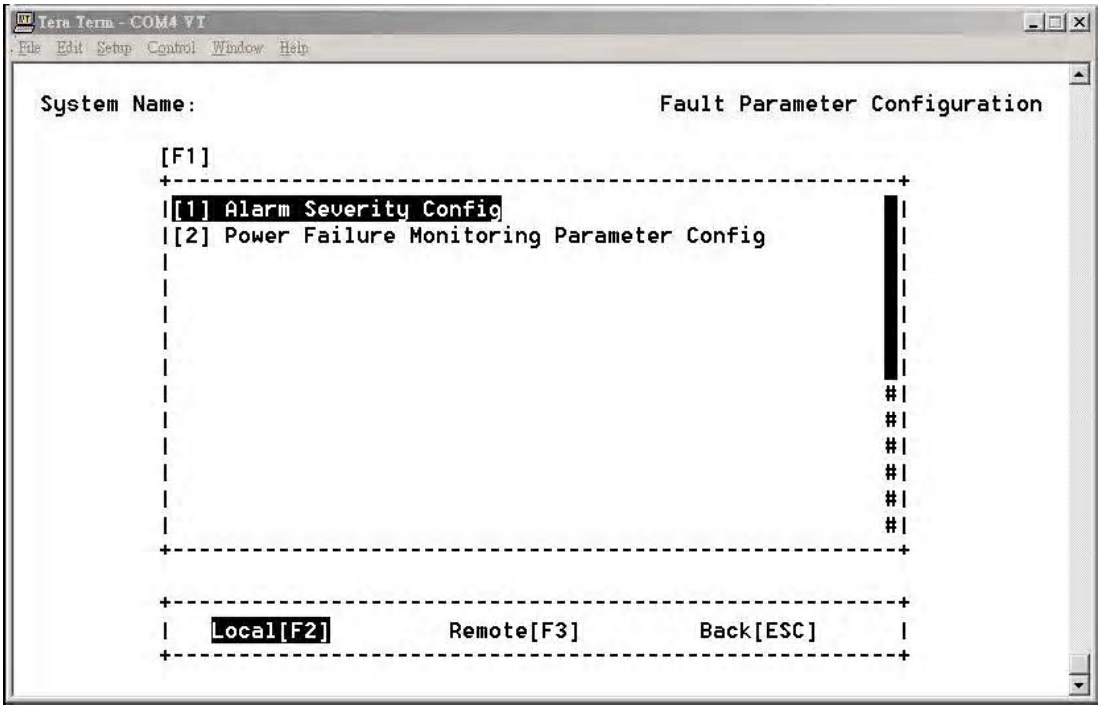
You may use the function keys to modify the selected traffic link. There are two PM types: the **`Quarter`** (15 minutes), the **`Day`** (24 hours).



Aggregate Threshold Parameters Editing Screen

Fault Management Parameters Configuration

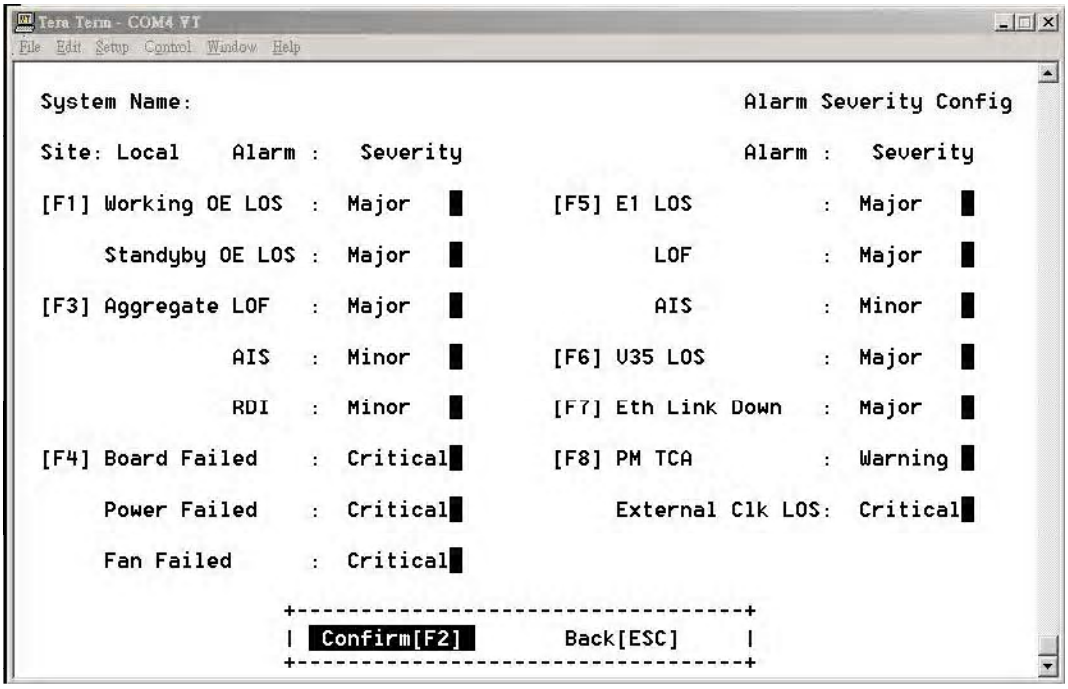
Fault Parameter Configuration



Fault Parameter Configuration Screen

The iMux provides fault management functions by setting the alarm severity for each failure alarm.

Alarm Severity Config

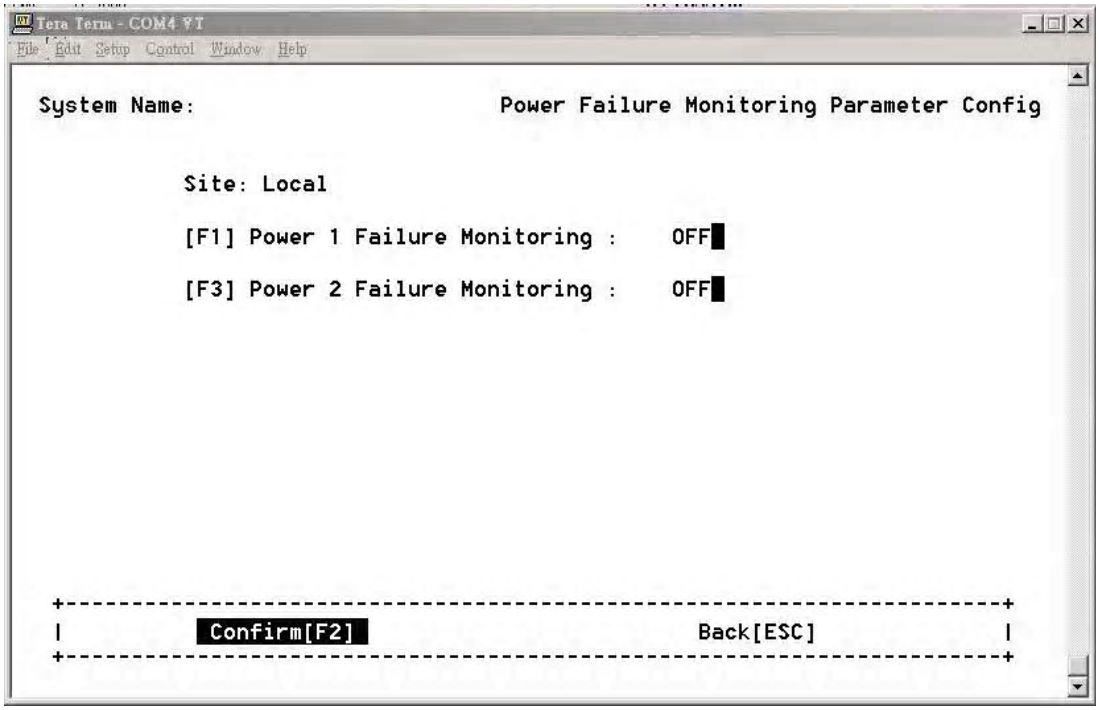


Alarm Severity Config Screen

The administrator can define alarm severity and easy to manage alarm status.

If the alarm severity configured as **`Critical`** or **`Major`**, the red **MAJ LED** turn on when an alarm occurs. Otherwise, both **`Minor`** and **`Warning`** alarm will turn on the yellow **MIN LED**.

Power Failure Monitoring Parameter Config

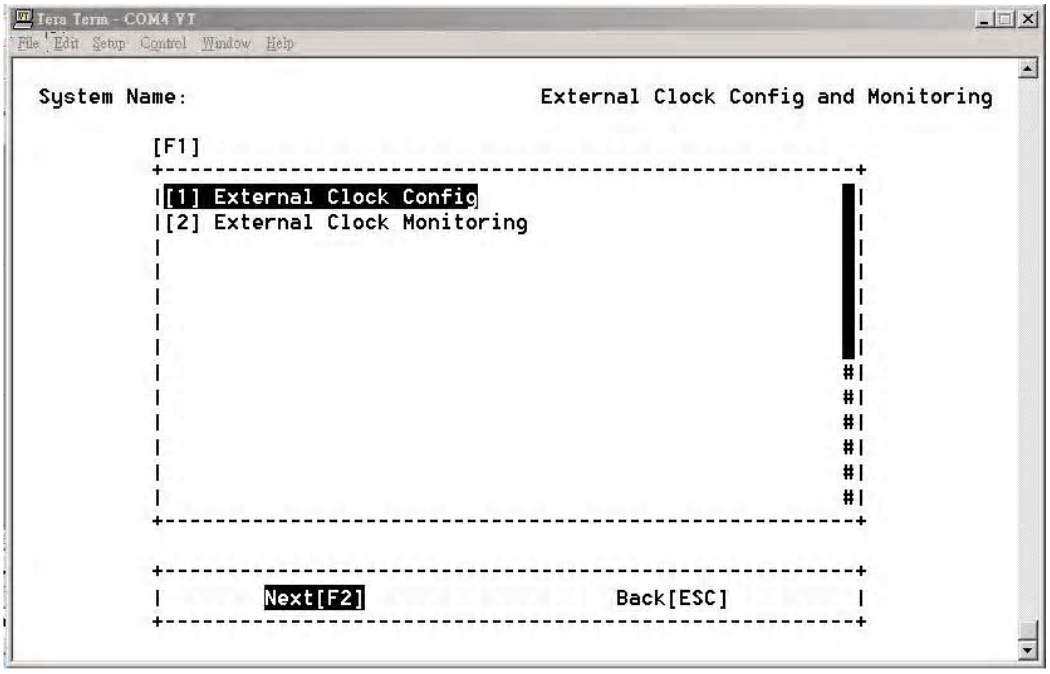

Tera Term - COM4 VT
File Edit Setup Control Window Help
System Name:
Power Failure Monitoring Parameter Config
Site: Local
[F1] Power 1 Failure Monitoring : OFF
[F3] Power 2 Failure Monitoring : OFF
Confirm[F2]
Back[ESC]

Power Failure Monitoring Parameter Config Screen

Provides the capability of power monitoring.

When **ON** is selected and the power module has failed, an alarm will be issued.

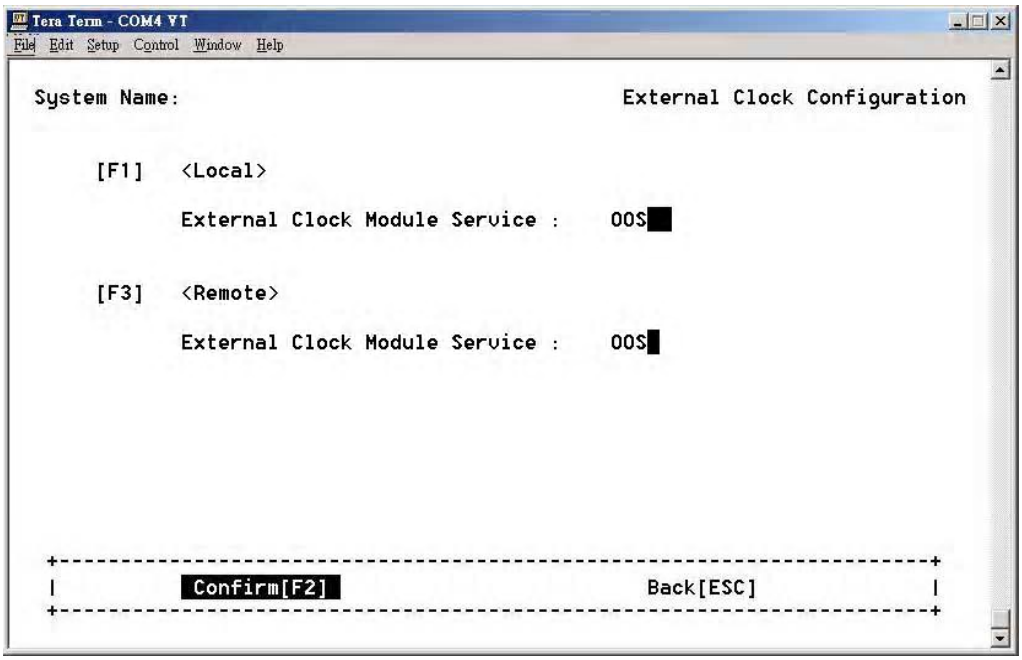
External Clock Configuration and Monitoring



External Clock Config and Monitoring Screen

To provide more stable synchronous for the system, you can use the built-in optional external clock module. This provides the extra external clock input for the whole system's reference.

External Clock Configuration

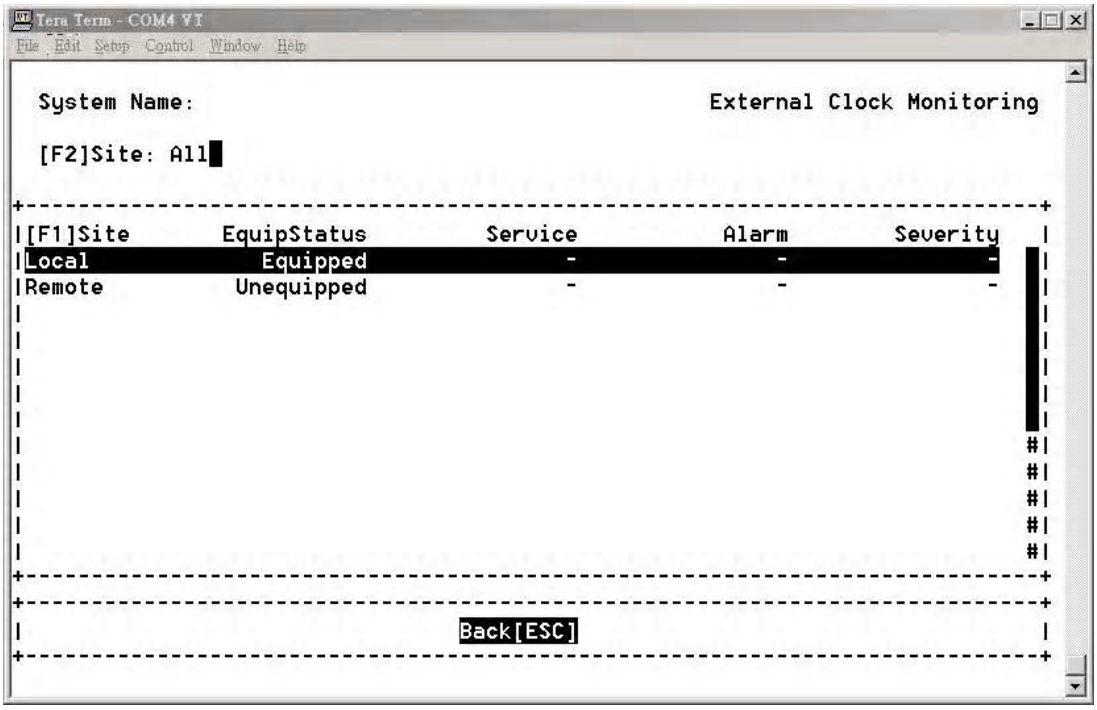


External Clock Configuration Screen

User can select **OOS** (Out of System) or **IS** (In System) to turn on or off the external clock input.

When the EOC (External Optional Clock) connection has failed or the External Cock module is not installed, the configuration will not show.

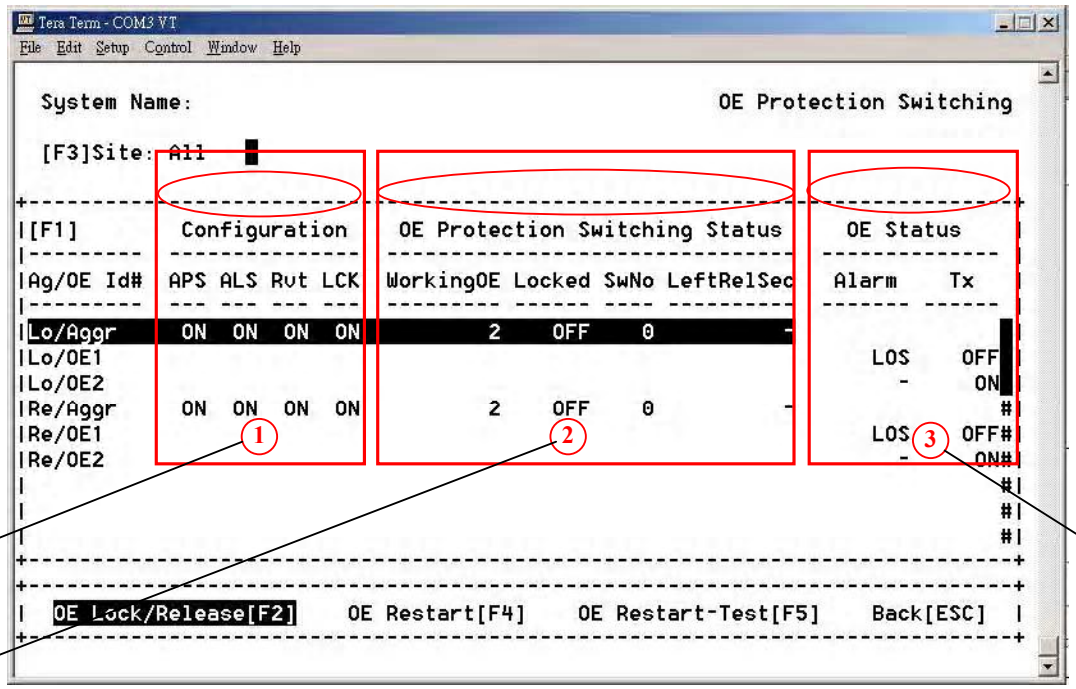
External Clock Monitoring



External Clock Monitoring Screen

If the External Clock Module is installed, the **EquipStatus** will show as **Equipped**, and **Unequipped** will be shown when the module is absent.

OE Protection Switching



The user may make the active OE module locked or released and manually restart the OE module from this screen.

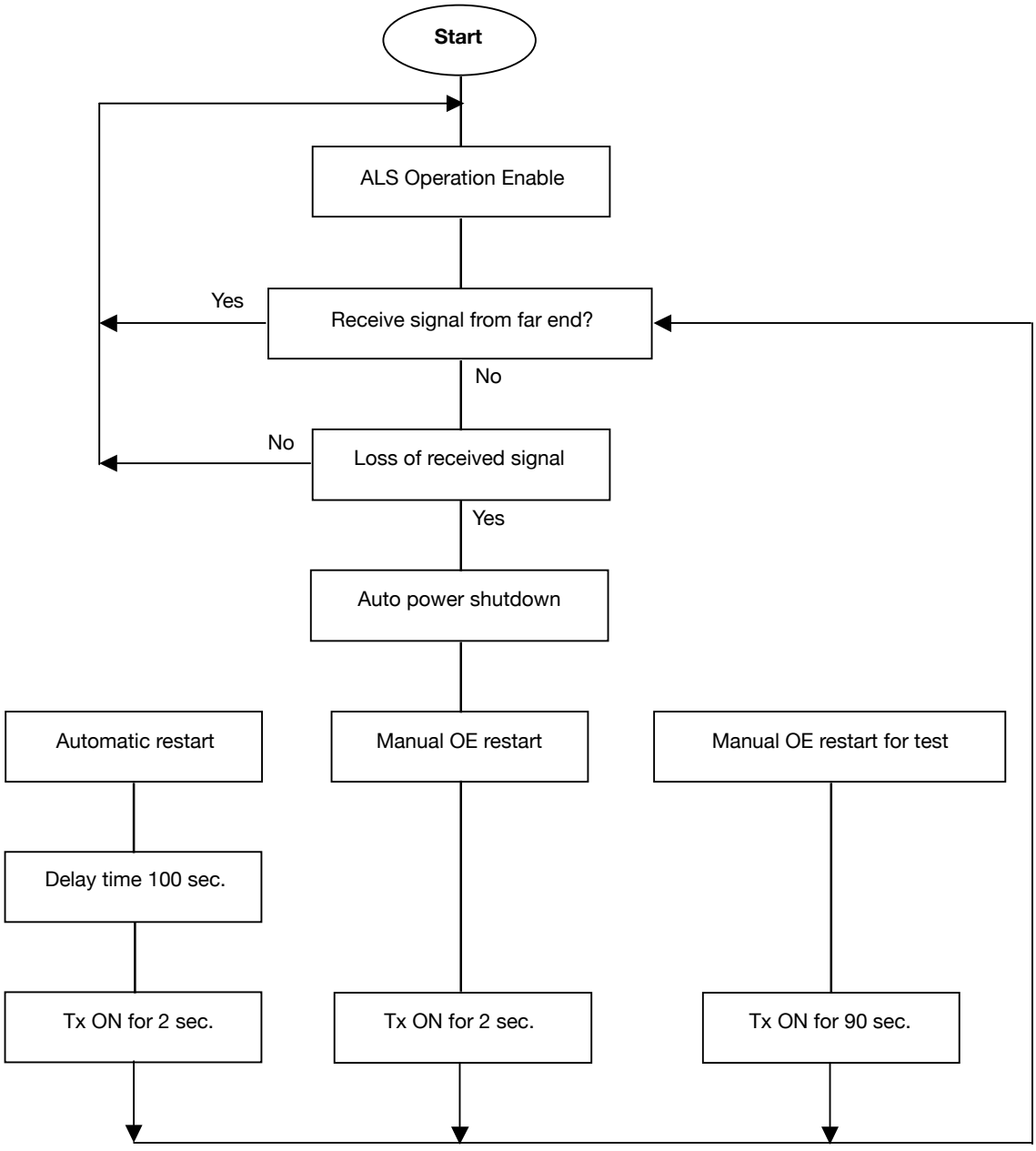
1. **Configuration**
   Shown the configuration of **APS** (Automatic Protection Switching), **ALS** (Automatic Laser Shutdown), **Rvt** (revertive operation), **LCK** (lockout the active OE module) from the Optical Interface Parameters Configuration screen.

2. **OE Protection Switching Status**
   Shown the current status of active OE module, the status of lock-out mechanism, the OE module switched times by automatic or manually, and the seconds left for release after locked state. The lock-out mechanism can be activated or deactivated by command **OE Lock/Release [F2]** on the aggregate interface. Some parameters are configured on the Optical Interface Parameters Configuration screen.

3. **OE Status**
   Shows the alarm and laser status of the OE modules. Shut down lasers may be restarted by using **OE Restart [F4]** and **OE Restart-Test [F5]** commands on the OE interfaces.

Automatic laser shutdown

The ALS mechanism implemented in iMux is referred to the ITU Recommendation ITU-T G.664. The ALS mechanism can be enabled or disabled in the Optical Interface Parameters Configuration screen.

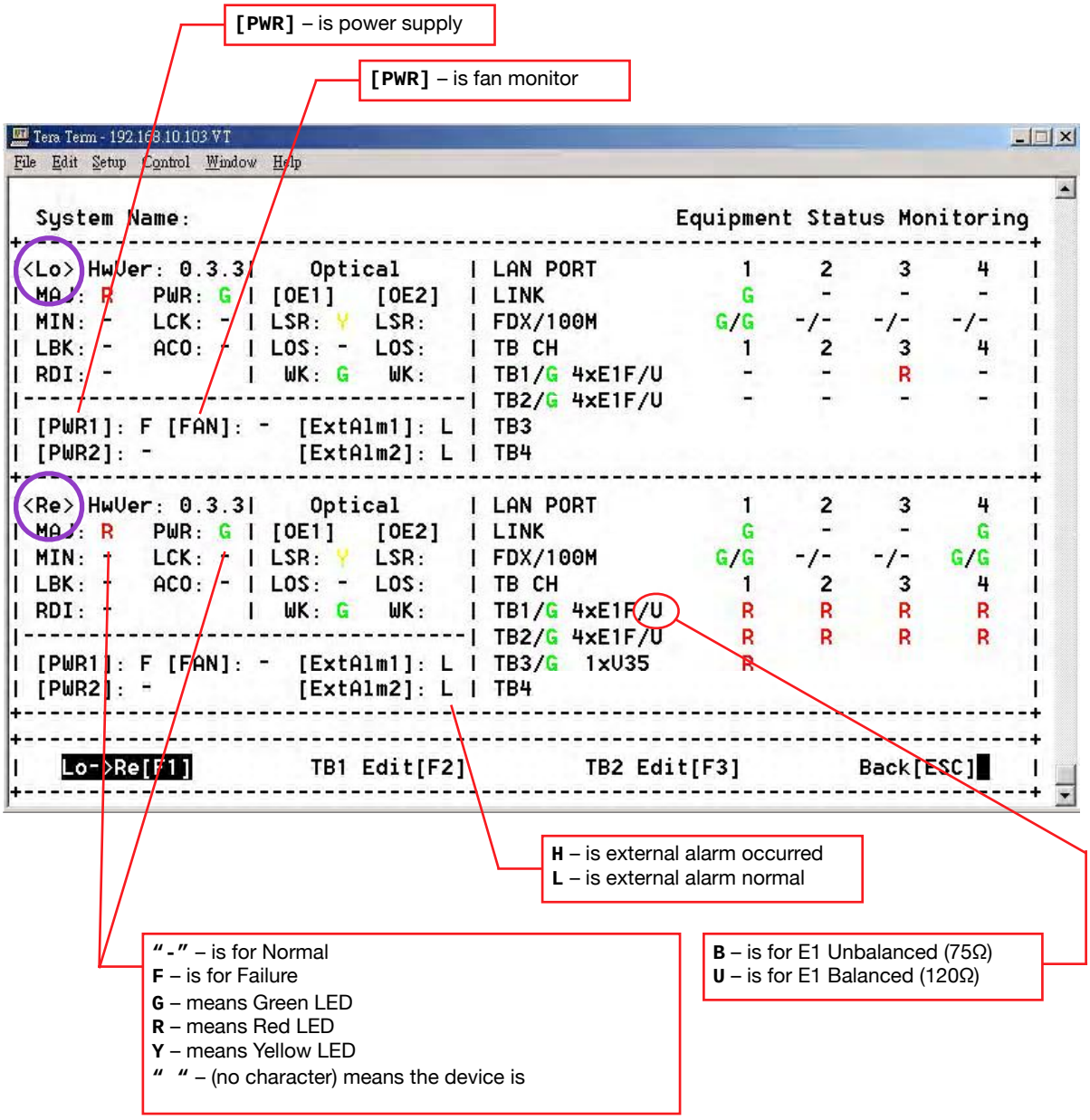


Automatic Laser Shutdown Flowchart

Equipment Status Monitoring

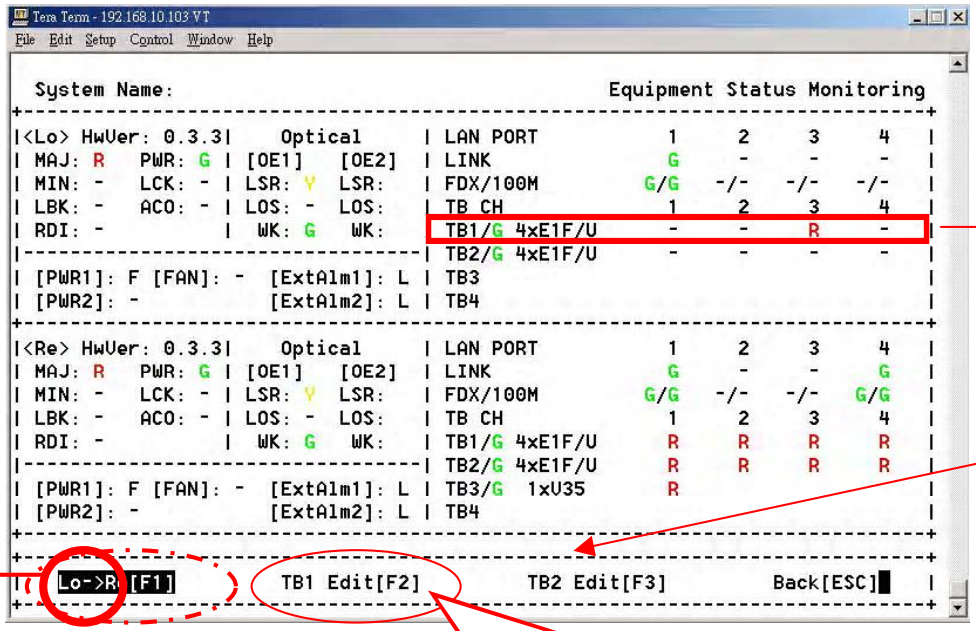
Status Monitoring Screen

On the equipment status monitoring screen, you can see an overall view of the alarm status of the interlinked rack systems, and it also provides the operator with direct access to the tributary card modes.


[PWR] – is power supply
[PWR] – is fan monitor
Tera Term - 192.168.10.103 VT
File Edit Setup Control Window Help
System Name: Equipment Status Monitoring
<Lo> HwVer: 0.3.3 Optical LAN PORT 1 2 3 4
MAJ: R PWR: G [OE1] [OE2] LINK G - - -
MIN: - LCK: - LSR: Y LSR: FDX/100M G/G -/- -/- -/-
LBK: - ACO: - LOS: - LOS: TB CH 1 2 3 4
RDI: - WK: G WK: TB1/G 4xE1F/U - - R -
TB2/G 4xE1F/U - - - -
[PWR1]: F [FAN]: - [ExtAlm1]: L TB3
[PWR2]: - [ExtAlm2]: L TB4
<Re> HwVer: 0.3.3 Optical LAN PORT 1 2 3 4
MAJ: R PWR: G [OE1] [OE2] LINK G - - G
MIN: - LCK: - LSR: Y LSR: FDX/100M G/G -/- -/- G/G
LBK: - ACO: - LOS: - LOS: TB CH 1 2 3 4
RDI: - WK: G WK: TB1/G 4xE1F/U R R R R
TB2/G 4xE1F/U R R R R
[PWR1]: F [FAN]: - [ExtAlm1]: L TB3/G 1xV35 R
[PWR2]: - [ExtAlm2]: L TB4
Lo->Re[F1] TB1 Edit[F2] TB2 Edit[F3] Back[ESC]
H – is external alarm occurred
L – is external alarm normal
"-" – is for Normal
F – is for Failure
G – means Green LED
R – means Red LED
Y – means Yellow LED
" " – (no character) means the device is
B – is for E1 Unbalanced (75Ω)
U – is for E1 Balanced (120Ω)

Equipment Status Monitoring Screen

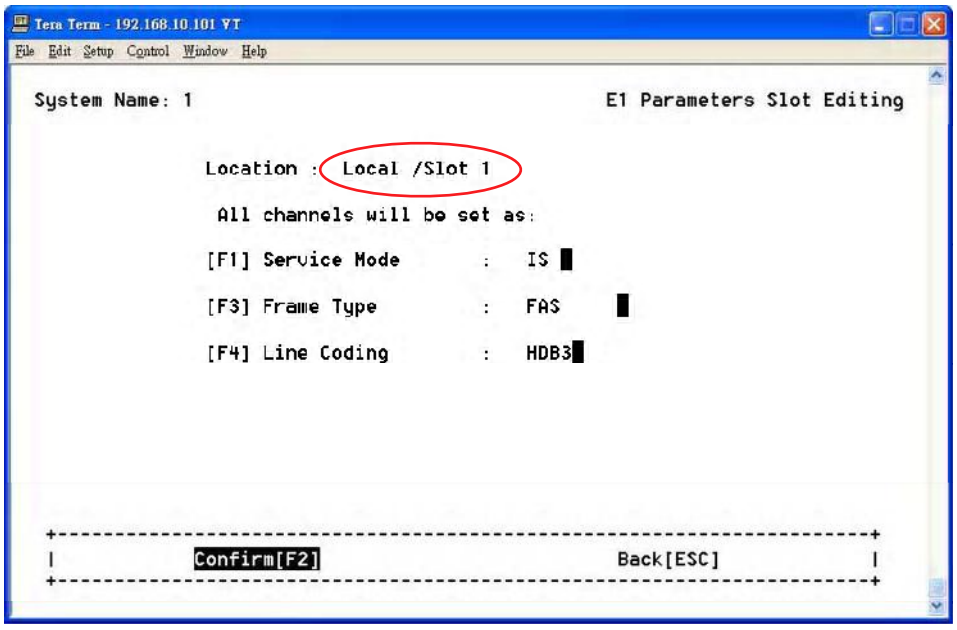
Local site tributary card setting


Tera Term - 192.168.10.103 VT
File Edit Setup Control Window Help
System Name:
Equipment Status Monitoring
|<Lo> HwVer: 0.3.3| Optical | LAN PORT 1 2 3 4
| MAJ: R PWR: G | [OE1] [OE2] | LINK G - - -
| MIN: - LCK: - | LSR: Y LSR: | FDX/100M G/G -/- -/- -/-
| LBK: - ACO: - | LOS: - LOS: | TB CH 1 2 3 4
| RDI: - | WK: G WK: | TB1/G 4xE1F/U - - R -
| TB2/G 4xE1F/U - - - -
| [PWR1]: F [FAN]: - [ExtAlm1]: L | TB3
| [PWR2]: - [ExtAlm2]: L | TB4
|<Re> HwVer: 0.3.3| Optical | LAN PORT 1 2 3 4
| MAJ: R PWR: G | [OE1] [OE2] | LINK G - - G
| MIN: - LCK: - | LSR: Y LSR: | FDX/100M G/G -/- -/- G/G
| LBK: - ACO: - | LOS: - LOS: | TB CH 1 2 3 4
| RDI: - | WK: G WK: | TB1/G 4xE1F/U R R R R
| TB2/G 4xE1F/U R R R R
| [PWR1]: F [FAN]: - [ExtAlm1]: L | TB3/G 1xU35 R
| [PWR2]: - [ExtAlm2]: L | TB4
Lo->R [F1]
TB1 Edit[F2]
TB2 Edit[F3]
Back[ESC]

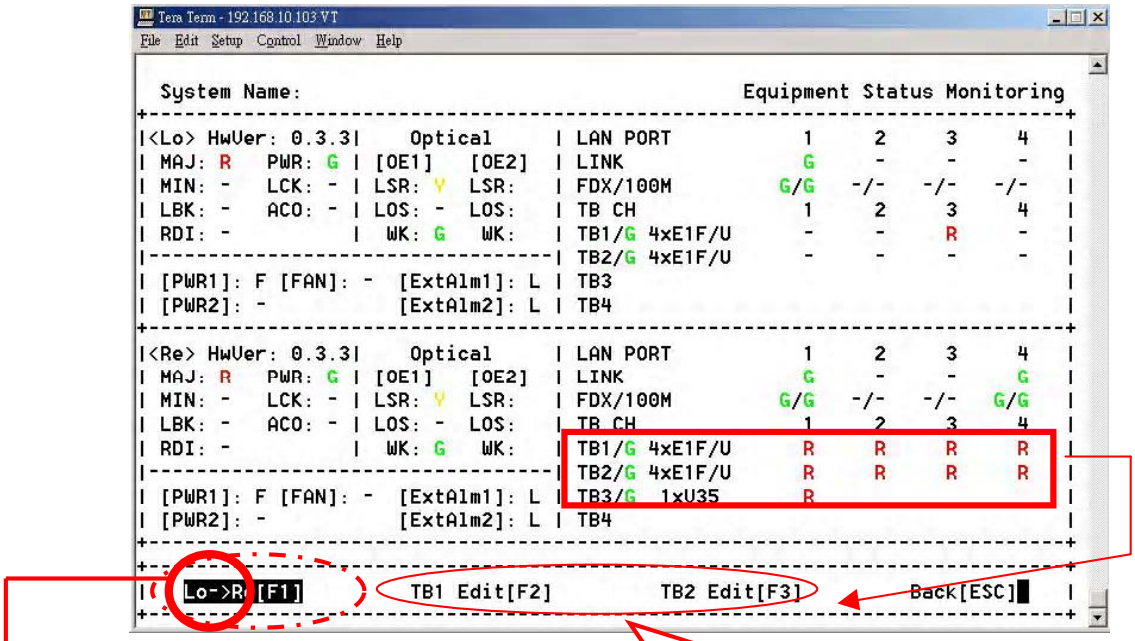
Lo – means Local Site

When a card is plugged into **TB1** (Tributary Slot 1), this row will show TB card data here. In this example, when a module is installed, pressing **[F2]** will let you set parameters for that slot.

Into Card Parameters Setting screen


Tera Term - 192.168.10.101 VT
File Edit Setup Control Window Help
System Name: 1
E1 Parameters Slot Editing
Location : Local /Slot 1
All channels will be set as:
[F1] Service Mode : IS
[F3] Frame Type : FAS
[F4] Line Coding : HDB3
Confirm[F2]
Back[ESC]

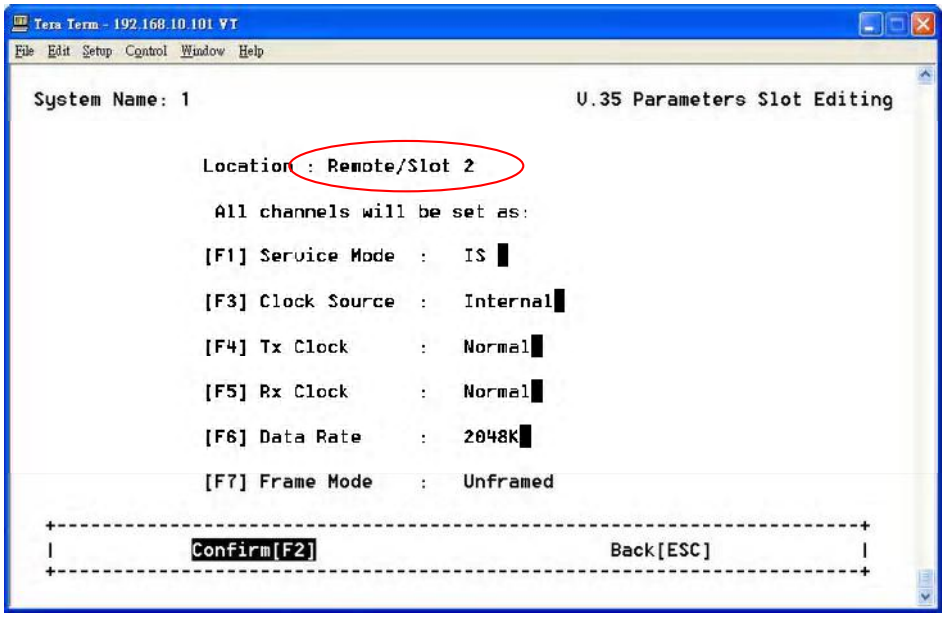
Remote site tributary card setting:


Tera Term - 192.168.10.103 VT
File Edit Setup Control Window Help
System Name:
Equipment Status Monitoring
<Lo> HwVer: 0.3.3	Optical	LAN PORT 1 2 3 4
MAJ: R PWR: G	[OE1] [OE2]	LINK G - - -
MIN: - LCK: -	LSR: Y LSR:	FDX/100M G/G -/- -/- -/-
LBK: - ACO: -	LOS: - LOS:	TB CH 1 2 3 4
RDI: -	WK: G WK:	TB1/G 4xE1F/U - - R -
	TB2/G 4xE1F/U - - - -
[PWR1]: F [FAN]: - [ExtAlm1]: L	TB3
[PWR2]: - [ExtAlm2]: L	TB4
<Re> HwVer: 0.3.3	Optical	LAN PORT 1 2 3 4
MAJ: R PWR: G	[OE1] [OE2]	LINK G - - G
MIN: - LCK: -	LSR: Y LSR:	FDX/100M G/G -/- -/- G/G
LBK: - ACO: -	LOS: - LOS:	TB CH 1 2 3 4
RDI: -	WK: G WK:	TB1/G 4xE1F/U R R R R
	TB2/G 4xE1F/U R R R R
[PWR1]: F [FAN]: - [ExtAlm1]: L	TB3/G 1xU35 R
[PWR2]: - [ExtAlm2]: L	TB4
Lo->R[F1] TB1 Edit[F2] TB2 Edit[F3] Back[ESC]

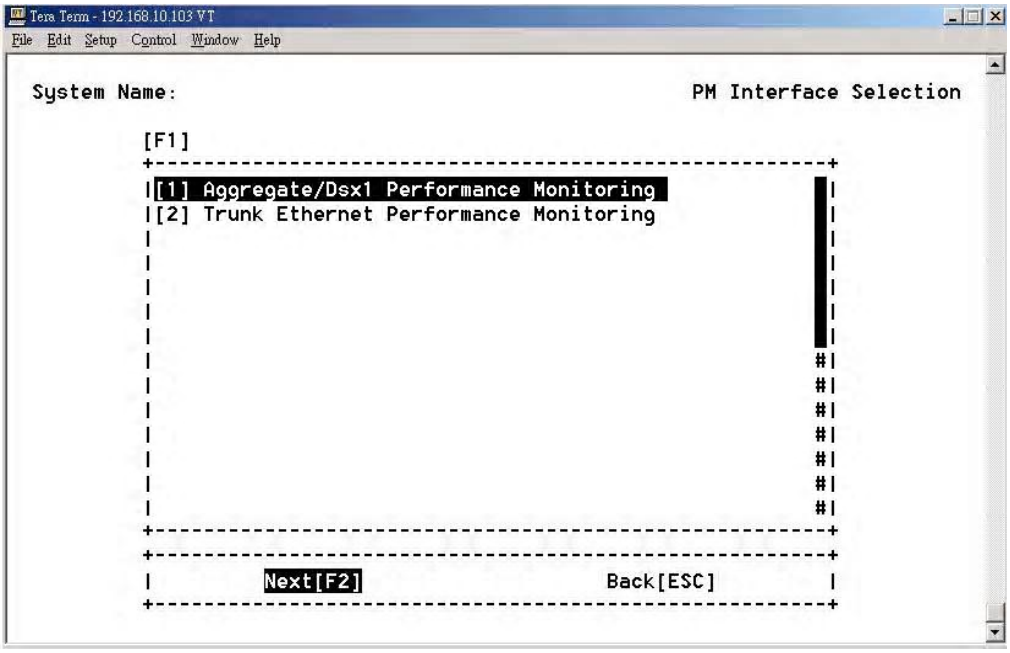
Re – indicates Remote Site

When a card is plugged into **TB1** (Tributary Slot 1), this row will show TB card data here. In this example, when a module is installed, pressing the desired function key will let you set parameters for that slot.

Into Card Parameters Setting screen


Tera Term - 192.168.10.101 VT
File Edit Setup Control Window Help
System Name: 1
V.35 Parameters Slot Editing
Location : Remote/Slot 2
All channels will be set as:
[F1] Service Mode : IS
[F3] Clock Source : Internal
[F4] Tx Clock : Normal
[F5] Rx Clock : Normal
[F6] Data Rate : 2048K
[F7] Frame Mode : Unframed
Confirm[F2] Back[ESC]

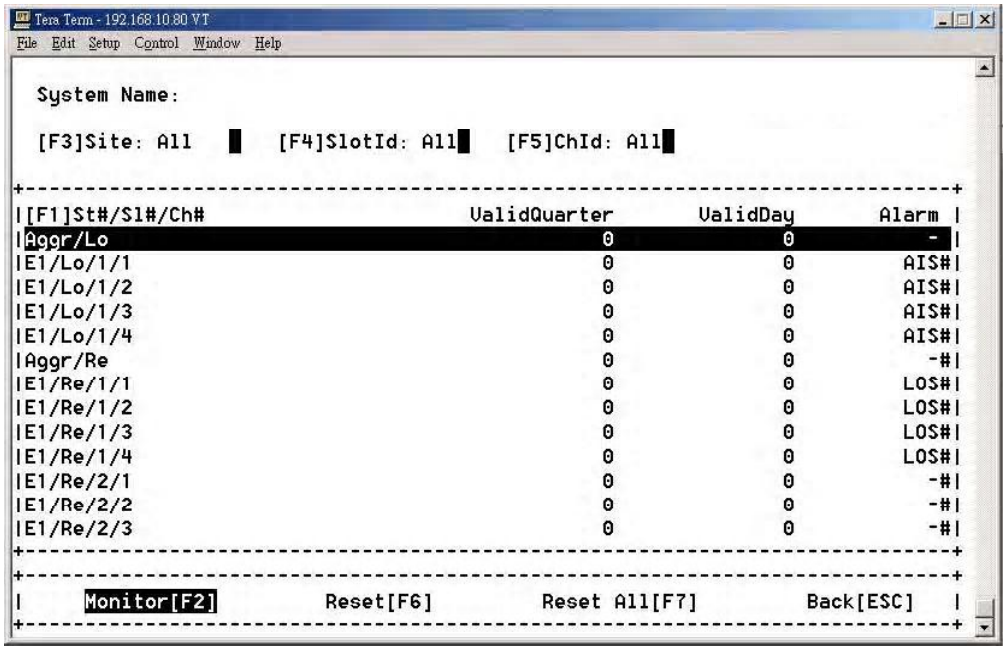
Performance Monitoring



Performance Monitoring Selection Screen

The performance monitoring screen shows the Aggregate/Dsx1 and Ethernet PM (Performance Monitoring).

Aggregate/Dsx1 Performance Monitoring

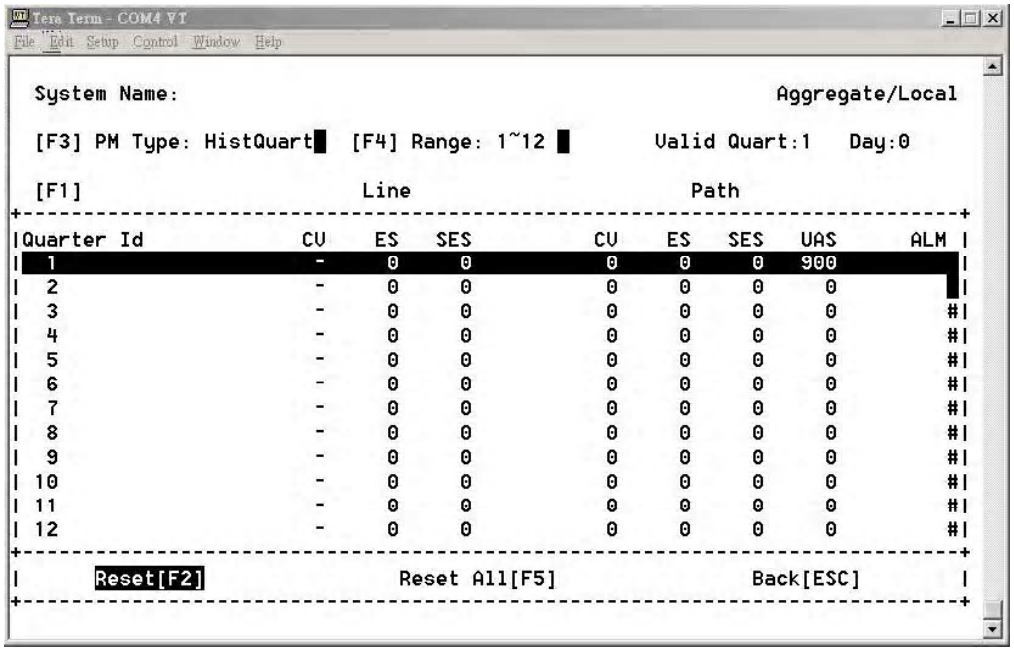


Performance Monitoring Screen

The **Performance Monitoring Screen** will show the valid quarters and valid days had been counted for each card. Select the card and access to next screen to see the detail performance data.

Function Key	Description
[F6] Reset	Clears all PM counters on the selected monitoring path
[F7] Reset All	Clears all PM counters on the monitoring paths

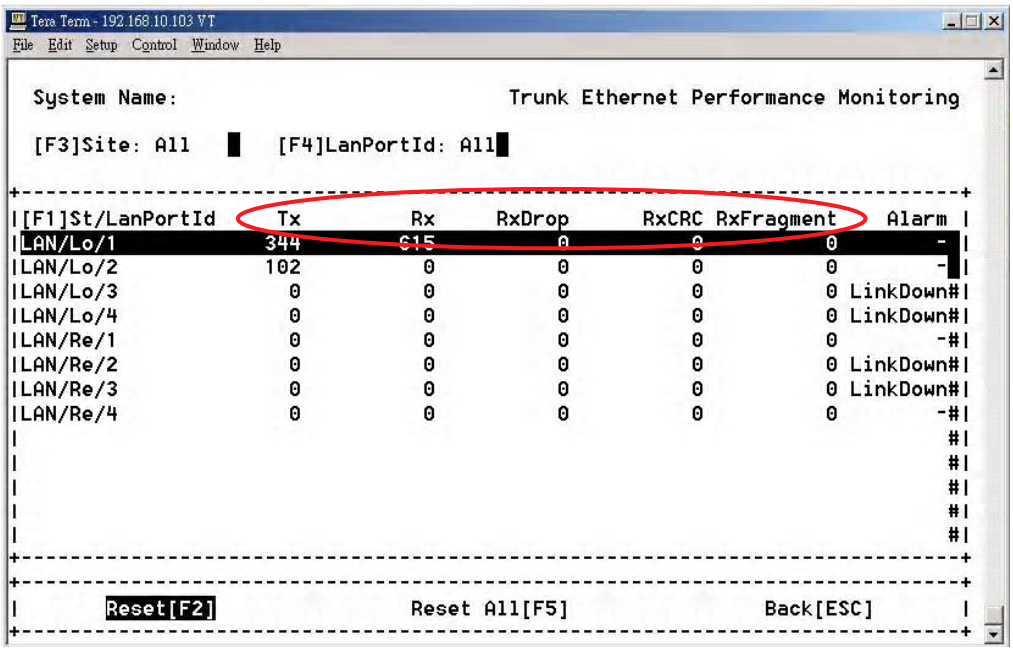
Performance Monitoring Settings


Tera Term - COM4 VT
File Edit Setup Control Window Help
System Name:
Aggregate/Local
[F3] PM Type: HistQuart
[F4] Range: 1~12
Valid Quart:1 Day:0
[F1]
Line
Path
Quarter Id CV ES SES CV ES SES UAS ALM
1 - 0 0 0 0 0 900
2 - 0 0 0 0 0 0
3 - 0 0 0 0 0 0 #
4 - 0 0 0 0 0 0 #
5 - 0 0 0 0 0 0 #
6 - 0 0 0 0 0 0 #
7 - 0 0 0 0 0 0 #
8 - 0 0 0 0 0 0 #
9 - 0 0 0 0 0 0 #
10 - 0 0 0 0 0 0 #
11 - 0 0 0 0 0 0 #
12 - 0 0 0 0 0 0 #
Reset[F2]
Reset All[F5]
Back[ESC]

Performance Monitoring Settings

Function Key	Mode	Description
[F3] PM Type	**CurrQuart**	Current Quarter
	HistQuart	History Quarter
	CurrDay	Current Day
	HistDay	History Day
	Quarter	Quarter Hour (every 15 minutes)
[F2] Reset		Clears the selected PM type
[F5] Reset All		Clears all the PM types

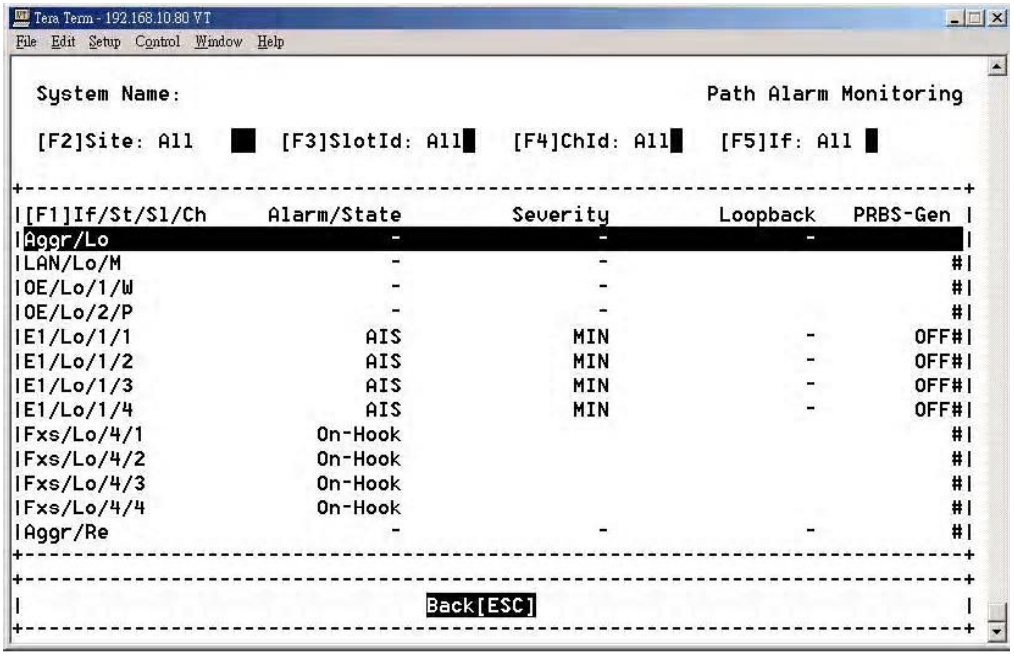
Trunk Ethernet Performance Monitoring


Tera Term - 192.168.10.103 VT
File Edit Setup Control Window Help
System Name:
Trunk Ethernet Performance Monitoring
[F3]Site: All
[F4]LanPortId: All
[F1]St/LanPortId Tx Rx RxDrop RxCRC RxFragment Alarm
LAN/Lo/1 344 615 0 0 0 -
LAN/Lo/2 102 0 0 0 0 -
LAN/Lo/3 0 0 0 0 0 LinkDown#
LAN/Lo/4 0 0 0 0 0 LinkDown#
LAN/Re/1 0 0 0 0 0 -#
LAN/Re/2 0 0 0 0 0 LinkDown#
LAN/Re/3 0 0 0 0 0 LinkDown#
LAN/Re/4 0 0 0 0 0 -#
Reset[F2]
Reset All[F5]
Back[ESC]

Trunk Ethernet Performance Monitoring Screen

Menu Item	Description
Tx	TX byte or packet counter. This counter is incremented once for every data byte/packet of a transmitted packet.
Rx	RX byte or packet counter. This counter is incremented once for every data byte of a received and forwarded good packet. RX byte/packet count includes both forwarded and dropped good packets. For mirror RX forwarded packets, if these are not good packets they will not be counted.
RxDrop	RX drop packet count. Packet drop events could be due to lack of resource, local packet, etc. If the mirror RX function is enable and the packets are only received by the mirror port, these packets are also included in the mirrored ports drop packet counter. Packet lengths less than 64 bytes are not included.
RxCRC	RX CRC error packet counter. This counter is incremented once for every received packet with a length more than 64 bytes but with a CRC error. Oversize packets are also included in this counter.
RxFragment	RX fragment, collision, and undersize packet count. These packet lengths are less than 64 bytes.

Path Alarm/State Monitoring



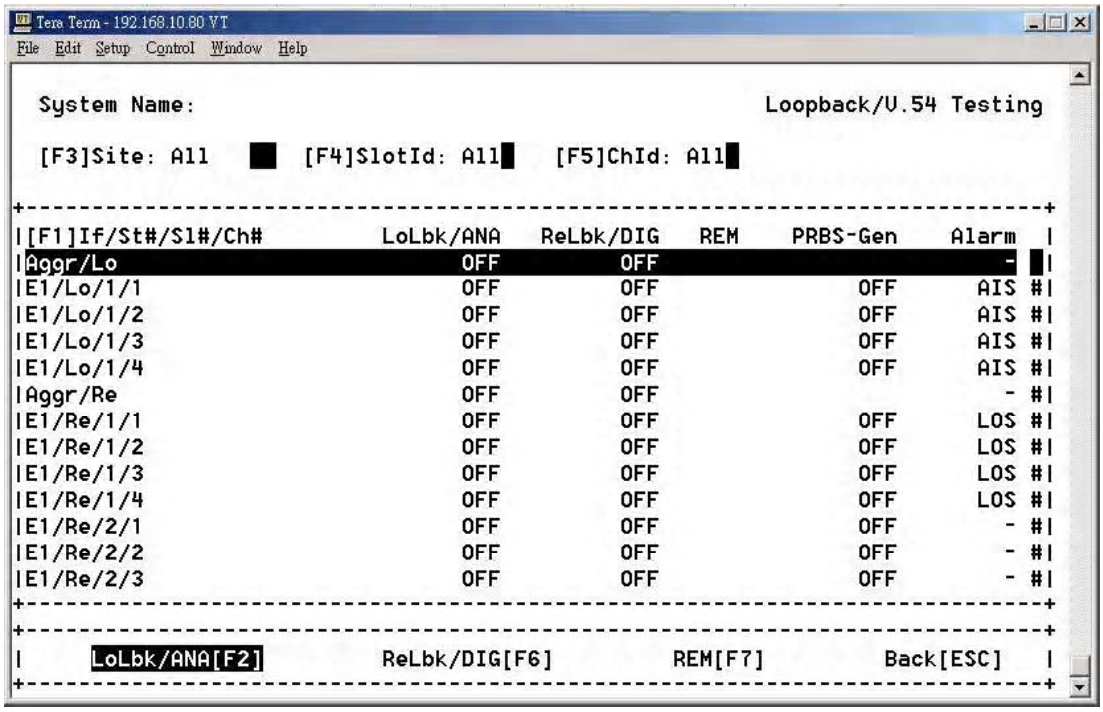
Path Alarm Monitoring Screen

This screen shows all of alarm status for all monitoring path. Some diagnostic testing work will cause an alarm to be triggered, and the status of loopback (V.54) and PRBS action shown as well.

Interface Alarms

Interface	Possible Alarms
OE	LOS
Aggr	LOF, RDI, AIS
T1/E1	LOS, LOF, RDI/AIS
V35	LOS
Ethernet	Link
LAN/WAN	Link
Fxo/Fxs	On-Hook, Off-Hook

Loopback/V.54 Testing


Tera Term - 192.168.10.80 VT
File Edit Setup Control Window Help
System Name: Loopback/V.54 Testing
[F3]Site: All [F4]SlotId: All [F5]ChId: All
[F1]If/St#/Sl#/Ch# LoLbk/ANA ReLbk/DIG REM PRBS-Gen Alarm
Aggr/Lo OFF OFF -
E1/Lo/1/1 OFF OFF OFF AIS #
E1/Lo/1/2 OFF OFF OFF AIS #
E1/Lo/1/3 OFF OFF OFF AIS #
E1/Lo/1/4 OFF OFF OFF AIS #
Aggr/Re OFF OFF - #
E1/Re/1/1 OFF OFF OFF LOS #
E1/Re/1/2 OFF OFF OFF LOS #
E1/Re/1/3 OFF OFF OFF LOS #
E1/Re/1/4 OFF OFF OFF LOS #
E1/Re/2/1 OFF OFF OFF - #
E1/Re/2/2 OFF OFF OFF - #
E1/Re/2/3 OFF OFF OFF - #
LoLbk/ANA[F2] ReLbk/DIG[F6] REM[F7] Back[ESC]

Loopback/V.54 Testing Screen

For diagnostic purposes, low speed E1 or V.35 data channels and high speed aggregate signals can be locally loop-backed or remotely loop-backed.

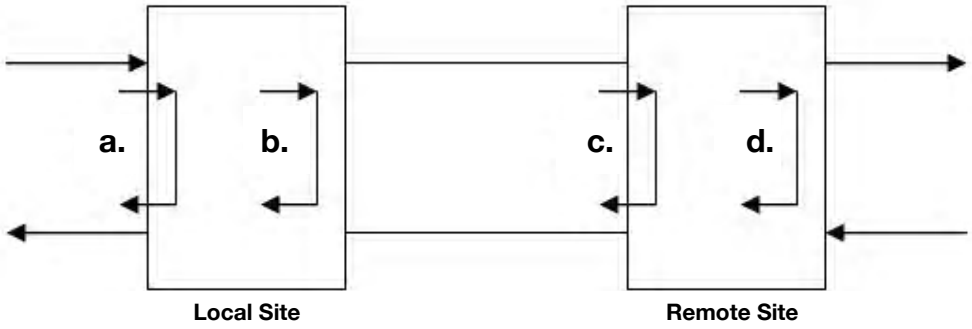
Loopback Testing

E1 Module

There are four types of loopback functions for the E1 Module:

1. Tributary Local Loopback (for each E1 signal)
2. Aggregate Local Loopback (for all multiplexed E1 signals)
3. Aggregate Remote Loopback (for all multiplexed E1 signals)
4. Tributary Remote Loopback. (for each E1 signal)

Users can select whether to diagnose a specific channel or all channels under the loopback / V.54 Testing.



a. TributaryLocalLoopback: In the Loopback/V.54 Testing screen, select the slot ID which is on the tributary card in the local site, then choose **LoLbk/ANA[F2]**.

b. AggregateLocalLoopback: In the Loopback/V.54 Testing screen, select the **Aggr/Lo** aggregate item in the local site then choose **LoLbk/ANA[F2]**.

c. AggregateRemoteLoopback: In the Loopback/V.54 Testing screen, select the **Aggr/Lo** aggregate item in the remote site then choose **ReLbk/DIG[F6]**.

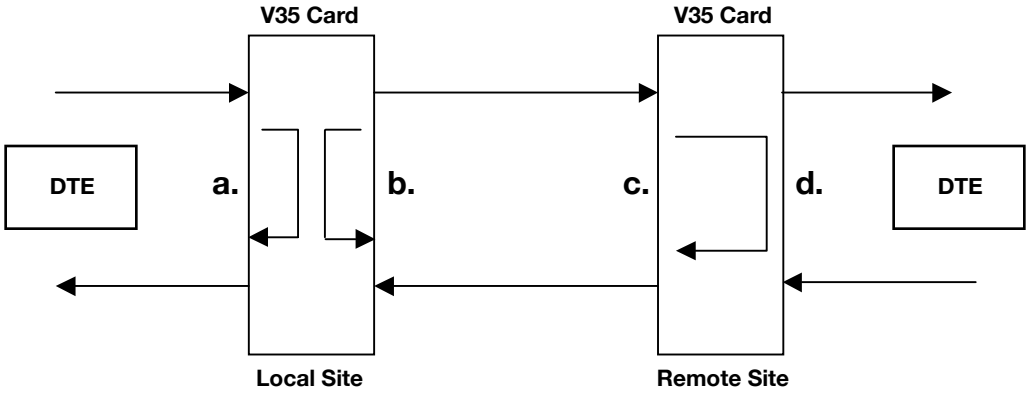
d. TributaryRemoteLoopback: In the Loopback/V.54 Testing screen, select the slot ID which is on the tributary card in the remote site then choose **ReLbk/DIG[F6]**.

Note: In the E1 module, **REM** may not be selected because it is only for the V.35 module.

V.35 Module

There are three types of loopback functions for the V.35 Module:

1. Analog (**ANA**) Loopback
2. Digital (**DIG**) Loopback
3. Request Remote (**REM**) Loopback



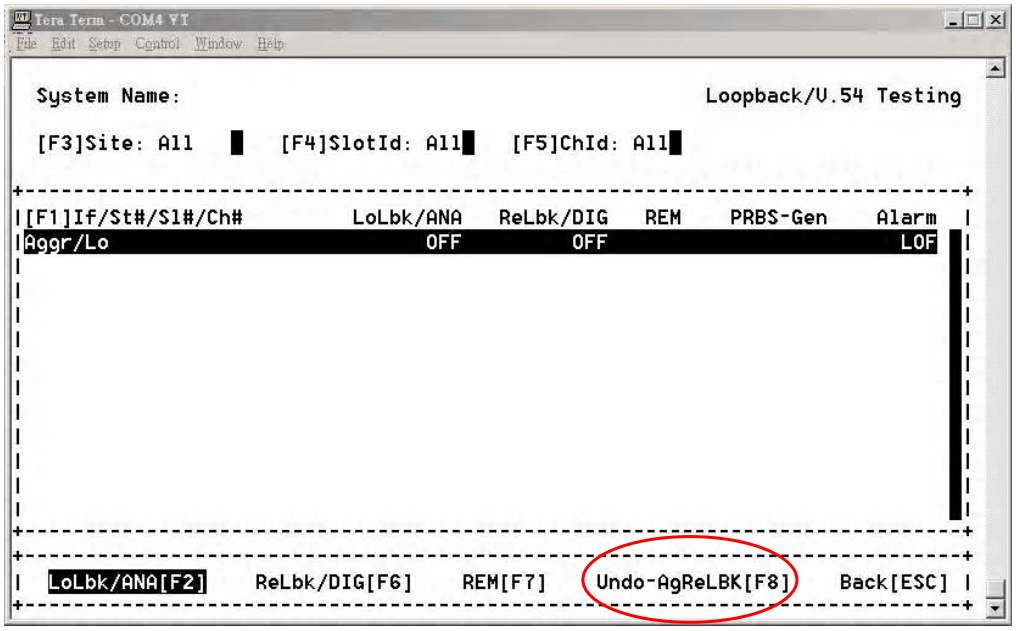
a. Analog (ANA) Loopback: In the Loopback/V.54 Testing screen, select the slot ID which is on the tributary card in the local site, then choose **LoLbk/ANA** item.

b. Digital (DIG) Loopback: In the Loopback/V.54 Testing screen, select the slot ID which is on the tributary card in the local site, then choose **ReLbk/DIG** item.

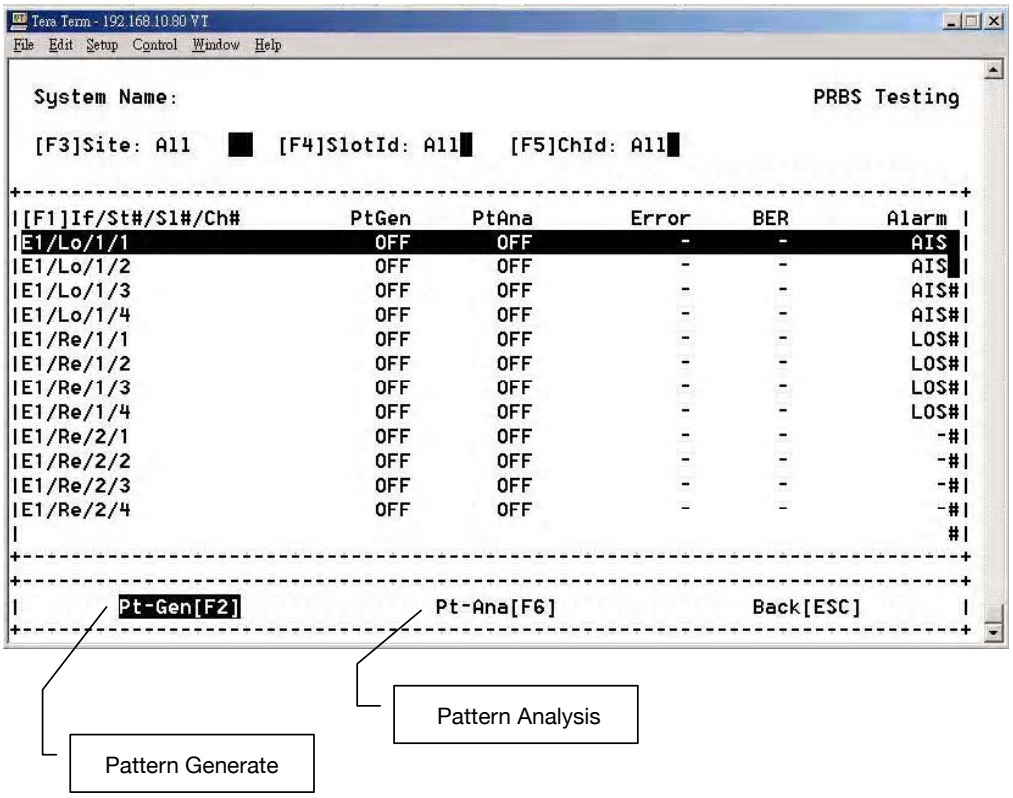
c. Request Remote (REM) Loopback: In the Loopback/V.54 Testing screen, select the slot ID which is on the tributary card in the local site, then choose **REM** item.

Note: function key **[F8]**

If the EOC (embedded channel) had broken such as in the aggregate remote loopback state then **Undo-AgReLBK[F8]** can be used to re-built the EOC channel. But, if the optical signal is lost, this function won't be enabled.



PRBS Test


Tera Term - 192.168.10.80 VT
File Edit Setup Control Window Help
System Name: PRBS Testing
[F3]Site: All [F4]SlotId: All [F5]ChId: All
|[F1]If/St#/Sl#/Ch# PtGen PtAna Error BER Alarm |
|E1/Lo/1/1 OFF OFF - - AIS |
|E1/Lo/1/2 OFF OFF - - AIS |
|E1/Lo/1/3 OFF OFF - - AIS#|
|E1/Lo/1/4 OFF OFF - - AIS#|
|E1/Re/1/1 OFF OFF - - LOS#|
|E1/Re/1/2 OFF OFF - - LOS#|
|E1/Re/1/3 OFF OFF - - LOS#|
|E1/Re/1/4 OFF OFF - - LOS#|
|E1/Re/2/1 OFF OFF - - -#|
|E1/Re/2/2 OFF OFF - - -#|
|E1/Re/2/3 OFF OFF - - -#|
|E1/Re/2/4 OFF OFF - - -#|
| #|
| Pt-Gen[F2] Pt-Ana[F6] Back[ESC] |
Pattern Analysis
Pattern Generate

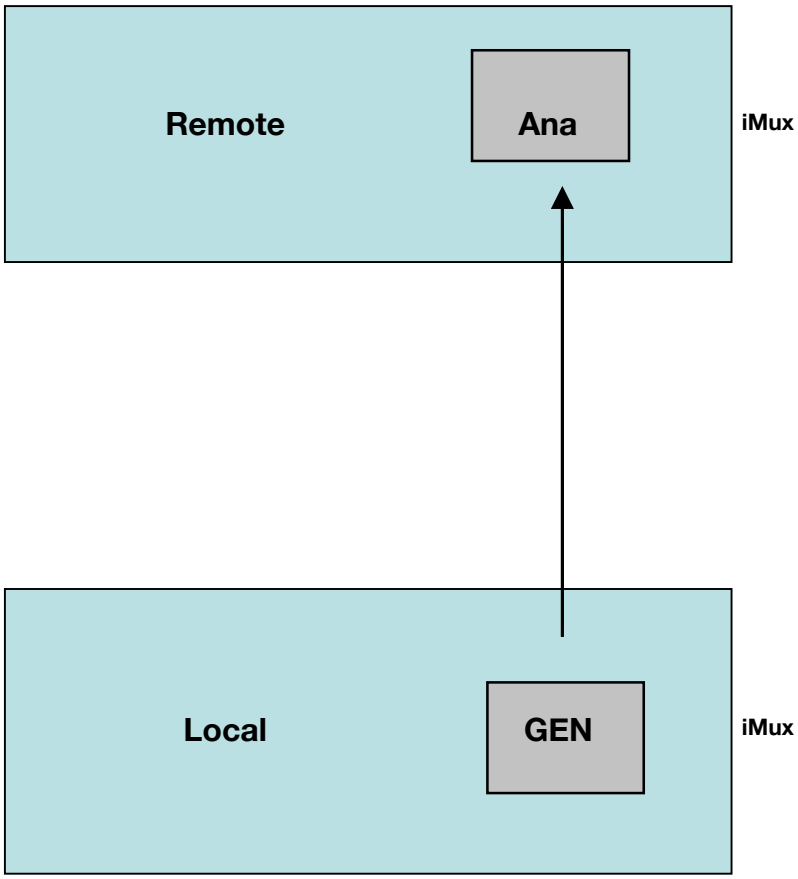
PRBS Testing Screen

The pattern of PRBS is 2^{15}-1(unframing). Both E1 and V35 are able to perform this testing.

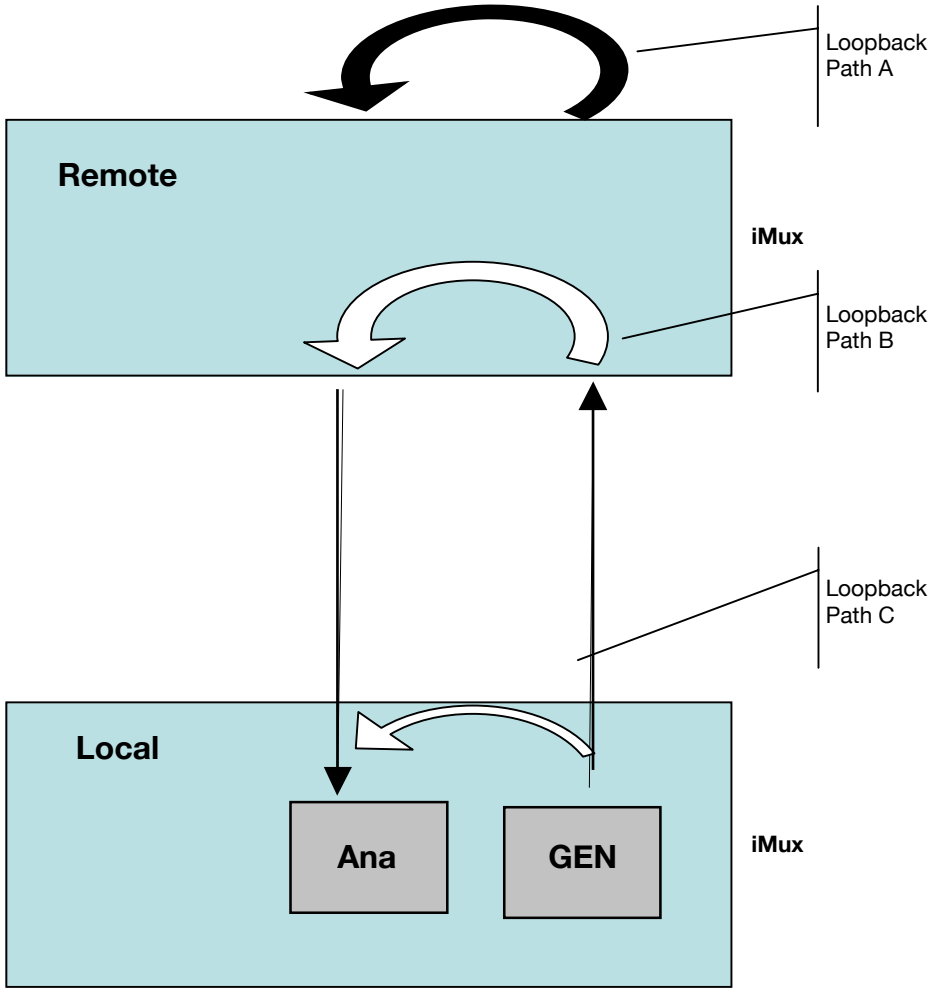
In order to do the self-test, any E1 data link can be selected to have a PRBS test. The tested result will be shown in the number of error bits as well as its error ratio.

Note: You can only choose one channel to generate or analyze at the same time.

One way PRBS test step



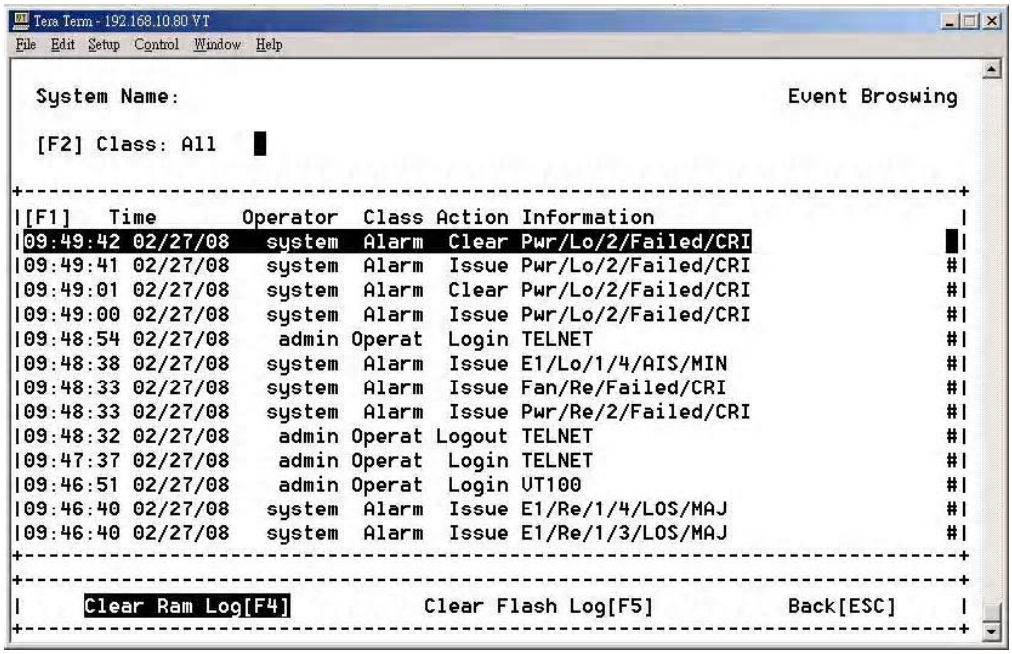
The round trip PRBS test function operating step



Refer to the loopback test function to verify the loopback setting.

To do the PRBS test, first set the loopback path (Loopback A, B or C) which you want to test. The local device will generate a test pattern to remote device, then the local device's analyzer will receive a test pattern through the loopback path. The test results will be shown on the screen.

Event Browsing


Tera Term - 192.168.10.80 VT
File Edit Setup Control Window Help
System Name: Event Broswing
[F2] Class: All
|[F1] Time Operator Class Action Information |
|09:49:42 02/27/08 system Alarm Clear Pwr/Lo/2/Failed/CRI |
|09:49:41 02/27/08 system Alarm Issue Pwr/Lo/2/Failed/CRI #|
|09:49:01 02/27/08 system Alarm Clear Pwr/Lo/2/Failed/CRI #|
|09:49:00 02/27/08 system Alarm Issue Pwr/Lo/2/Failed/CRI #|
|09:48:54 02/27/08 admin Operat Login TELNET #|
|09:48:38 02/27/08 system Alarm Issue E1/Lo/1/4/AIS/MIN #|
|09:48:33 02/27/08 system Alarm Issue Fan/Re/Failed/CRI #|
|09:48:33 02/27/08 system Alarm Issue Pwr/Re/2/Failed/CRI #|
|09:48:32 02/27/08 admin Operat Logout TELNET #|
|09:47:37 02/27/08 admin Operat Login TELNET #|
|09:46:51 02/27/08 admin Operat Login VT100 #|
|09:46:40 02/27/08 system Alarm Issue E1/Re/1/4/LOS/MAJ #|
|09:46:40 02/27/08 system Alarm Issue E1/Re/1/3/LOS/MAJ #|
| Clear Ram Log[F4] Clear Flash Log[F5] Back[ESC] |

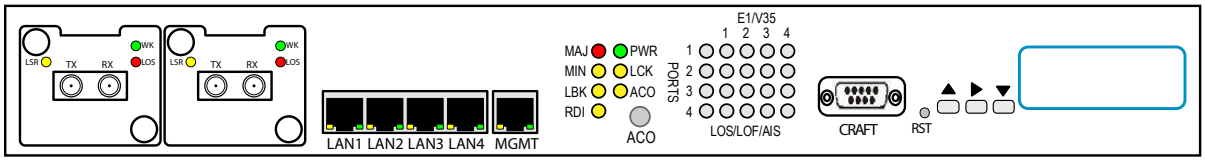
Event Browsing Screen

Menu Item	Description
Clear Ram Log[F4]	Clears all history events since the system last booted.
Clear Flash Log[F5]	If the event-saving function is enabled, this will clear all history events stored in flash memory.

6. Front Panel Operation

Front LCD controls

The iMux provides a easy way to configure, maintain, and test the unit by using the front panel controls with the LCD.



iMux Front Panel

The default password for accessing the iMux via the front panel is a combination of the buttons as below, from left to right:

Button	Up	Right	Down	Up

Note: The login password in the LCD window may be changed via VT100 setting.

Front panel button functions are as follows:

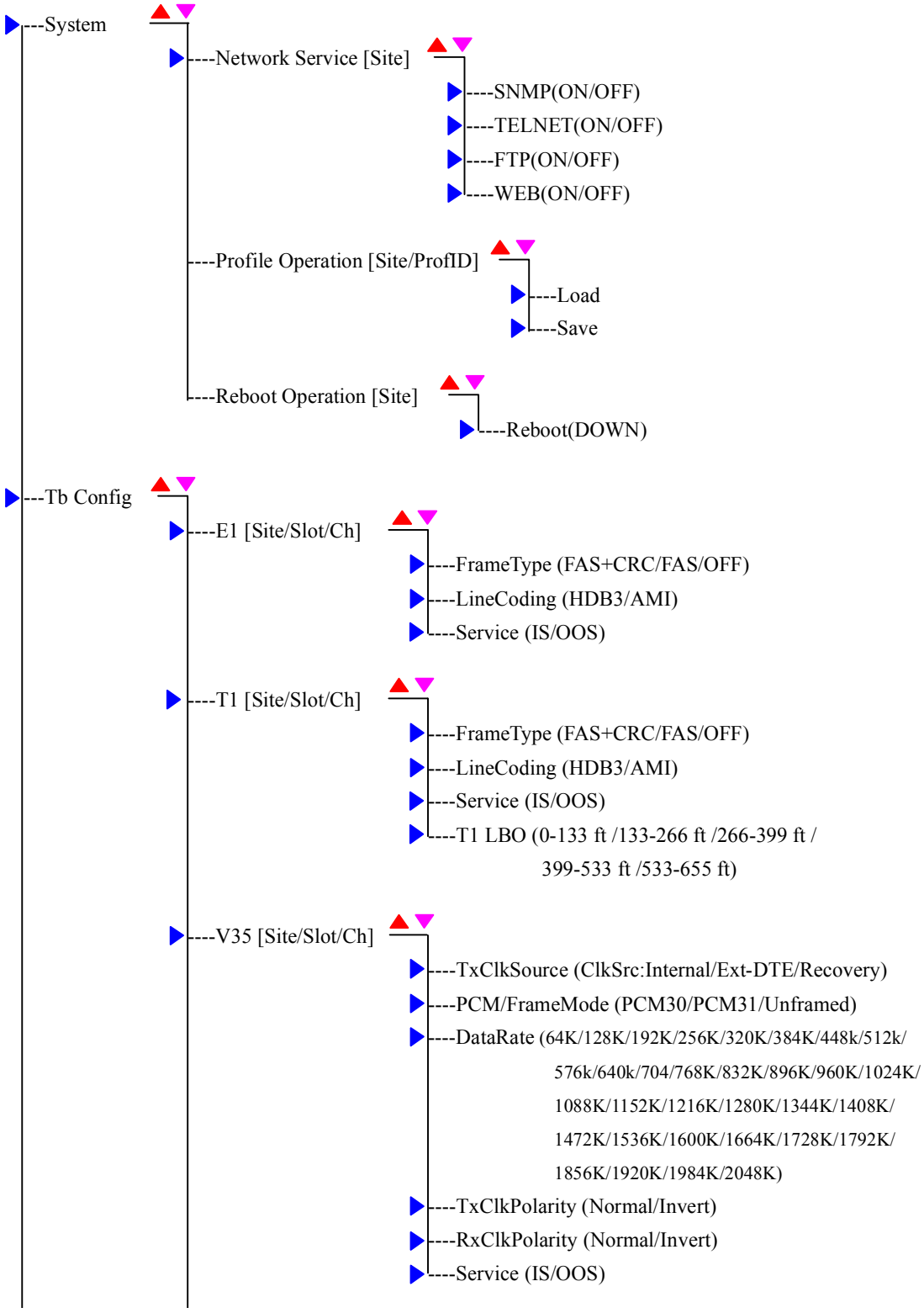
Go back to the upper level of the menu

Item select

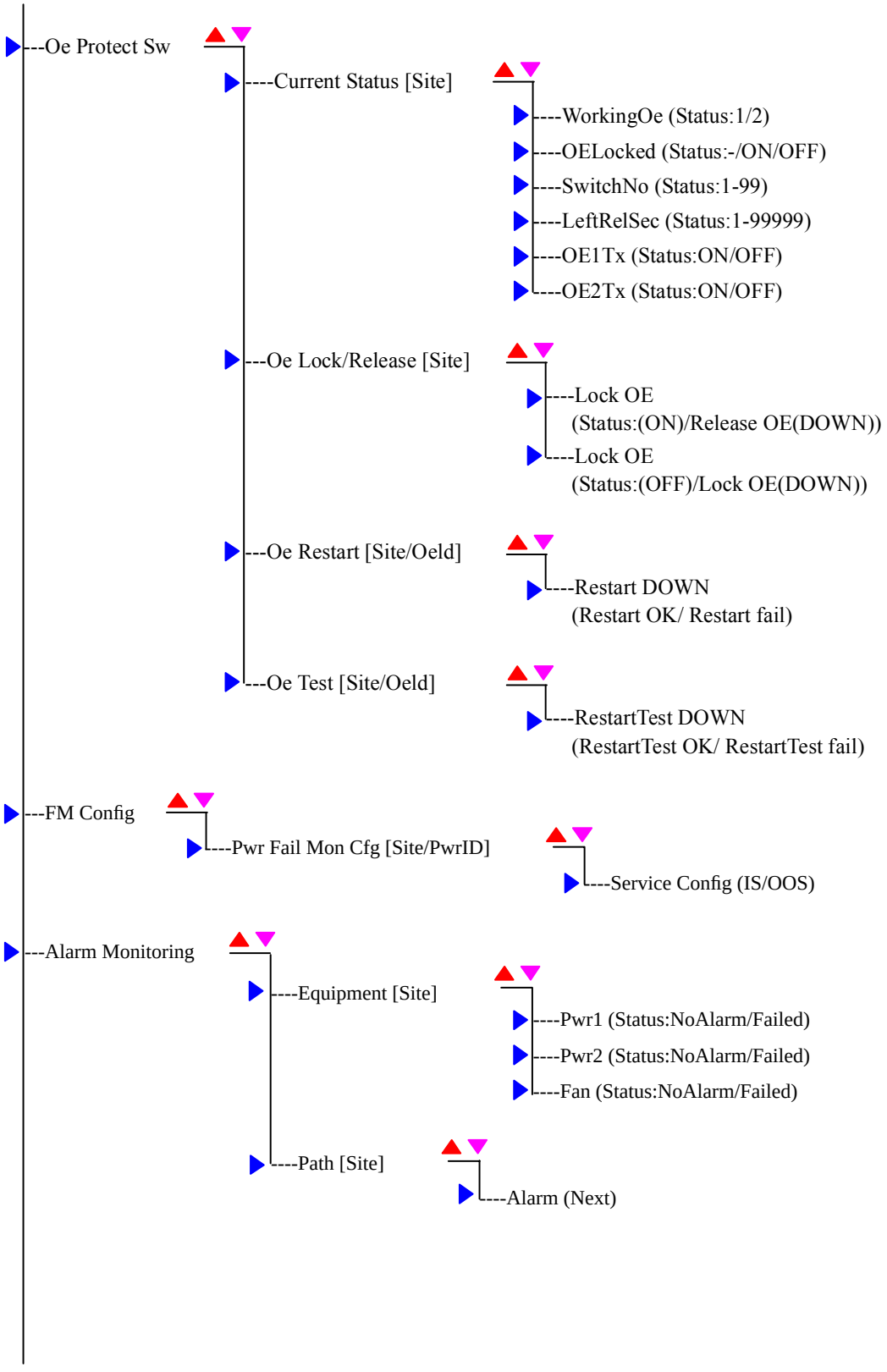
Enter key to go to a sub-menu or enable selected action

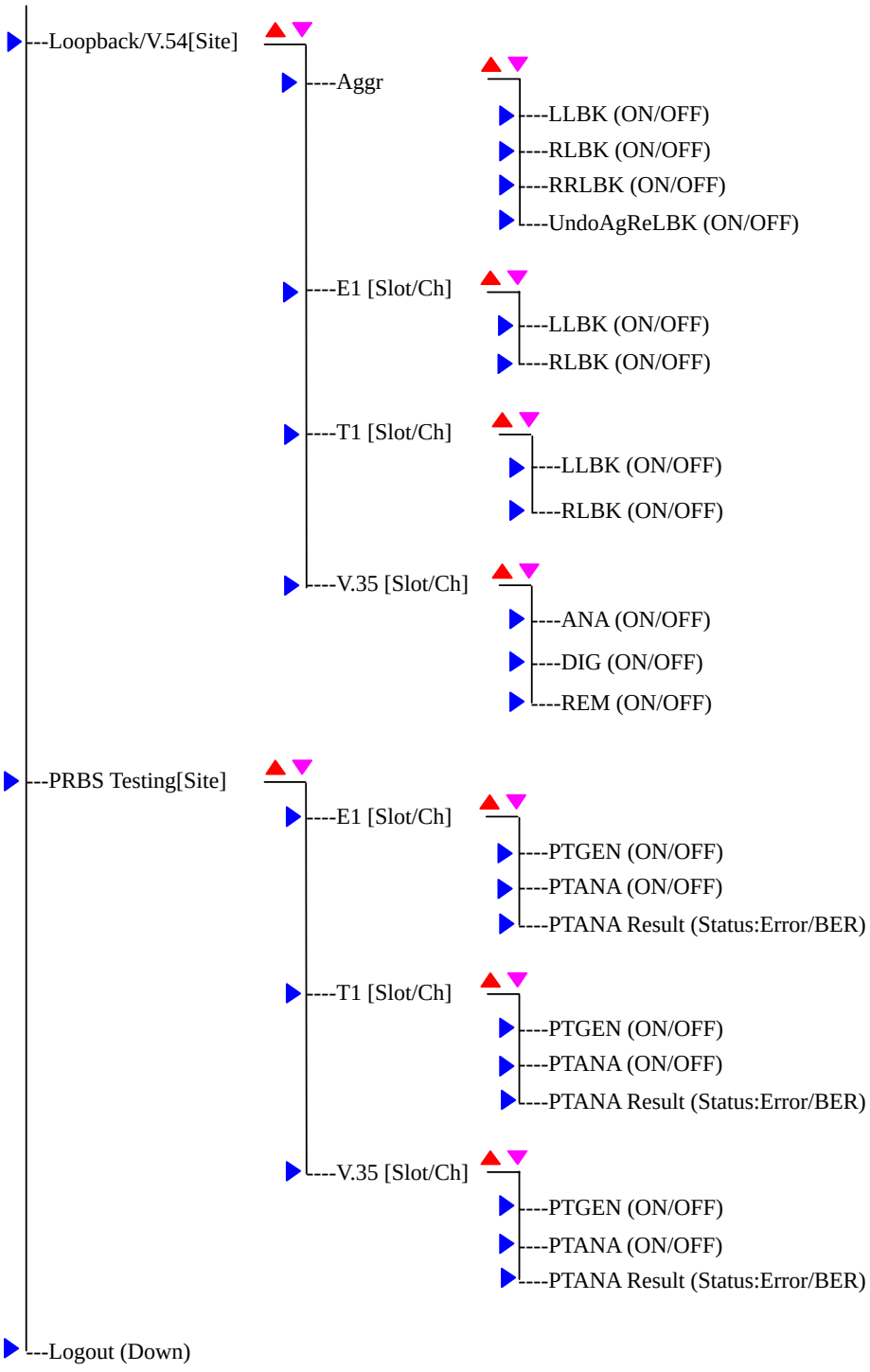
LCD Menu Tree

Password:_ _ _ _ (See LCD Login Configuration)



----FXX [Site/Slot/Ch]
----Service (IS/OOS)
----TSA [Site]
----TSA (Normal/2E1+2V.35/7E1+1V.35/CH4-.-.-CH5)
---Opt Config [Site]
----Working OE (1/2)
----ALS (ON/OFF)
----Standby OE (ON/OFF)
----APS (ON/OFF)
---Trunk Eth Config
----General Config [Site]
----VLAN (Enable/Disable)
----Port Config [Site]
----Service (IS/OOS)
----AutoNeg (ON/OFF)
----Duplex (Full/Half)
----Speed (10M/100M)
----FlowCtrl (ON/OFF)
---Data Port Config [Site]
----Baud Rate(115200/57600/38400/19200/9600)
----Data Bit(8/7/6/5)
----Parity(Disable/Even/Odd)
----Stop Bit(1 bit/ 1.5 bit/ 2 bit)
---External Clock
----Config [Site]
----Service (ON/OFF)
----Monitoring [Site]
----EquipStatus (Status:Equipped/Unequipped)
----AlarmMonitoring (Status:None/Normal/LOS)


---Oe Protect Sw
----Current Status [Site]
----WorkingOe (Status:1/2)
----OELocked (Status:-/ON/OFF)
----SwitchNo (Status:1-99)
----LeftRelSec (Status:1-99999)
----OE1Tx (Status:ON/OFF)
----OE2Tx (Status:ON/OFF)
---Oe Lock/Release [Site]
----Lock OE
(Status:(ON)/Release OE(DOWN))
----Lock OE
(Status:(OFF)/Lock OE(DOWN))
---Oe Restart [Site/Oeld]
----Restart DOWN
(Restart OK/ Restart fail)
---Oe Test [Site/Oeld]
----RestartTest DOWN
(RestartTest OK/ RestartTest fail)
---FM Config
----Pwr Fail Mon Cfg [Site/PwrID]
----Service Config (IS/OOS)
---Alarm Monitoring
----Equipment [Site]
----Pwr1 (Status:NoAlarm/Failed)
----Pwr2 (Status:NoAlarm/Failed)
----Fan (Status:NoAlarm/Failed)
----Path [Site]
----Alarm (Next)

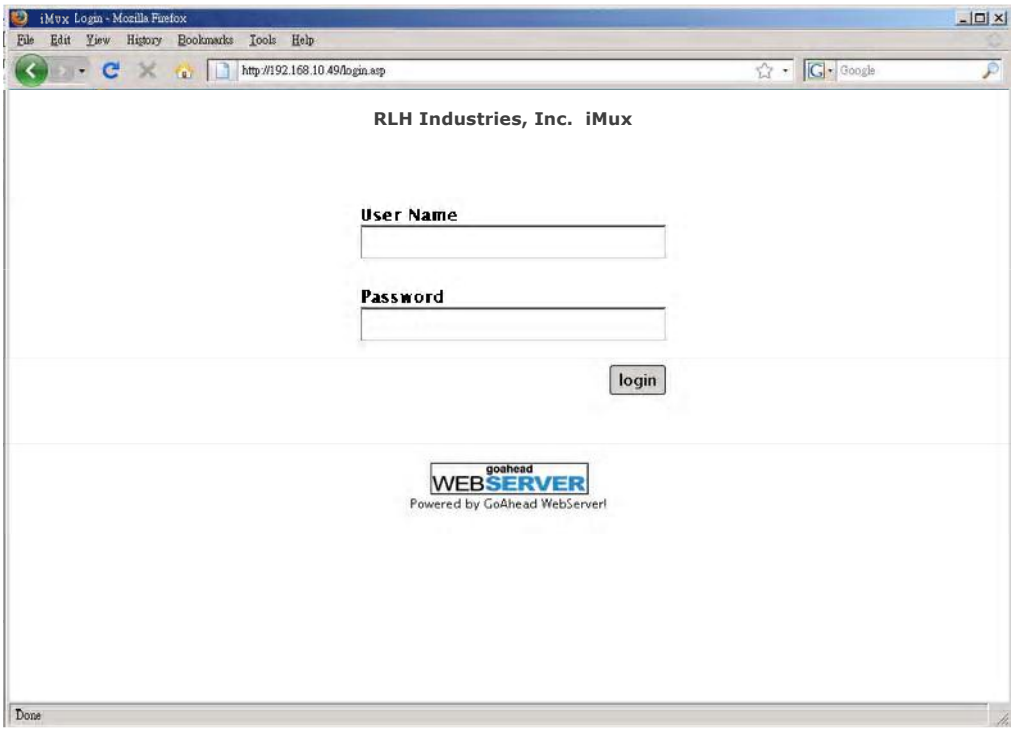

---Loopback/V.54[Site]
----Aggr
----LLBK (ON/OFF)
----RLBK (ON/OFF)
----RRLBK (ON/OFF)
----UndoAgReLBK (ON/OFF)
----E1 [Slot/Ch]
----LLBK (ON/OFF)
----RLBK (ON/OFF)
----T1 [Slot/Ch]
----LLBK (ON/OFF)
----RLBK (ON/OFF)
----V.35 [Slot/Ch]
----ANA (ON/OFF)
----DIG (ON/OFF)
----REM (ON/OFF)
---PRBS Testing[Site]
----E1 [Slot/Ch]
----PTGEN (ON/OFF)
----PTANA (ON/OFF)
----PTANA Result (Status:Error/BER)
----T1 [Slot/Ch]
----PTGEN (ON/OFF)
----PTANA (ON/OFF)
----PTANA Result (Status:Error/BER)
----V.35 [Slot/Ch]
----PTGEN (ON/OFF)
----PTANA (ON/OFF)
----PTANA Result (Status:Error/BER)
---Logout (Down)

7. Web Operating Interface

Using the web interface

To be able to use the web interface, the IP address must be enabled and configured via the command line interface. Enter the iMux IP number into a browser window to access the web interface.

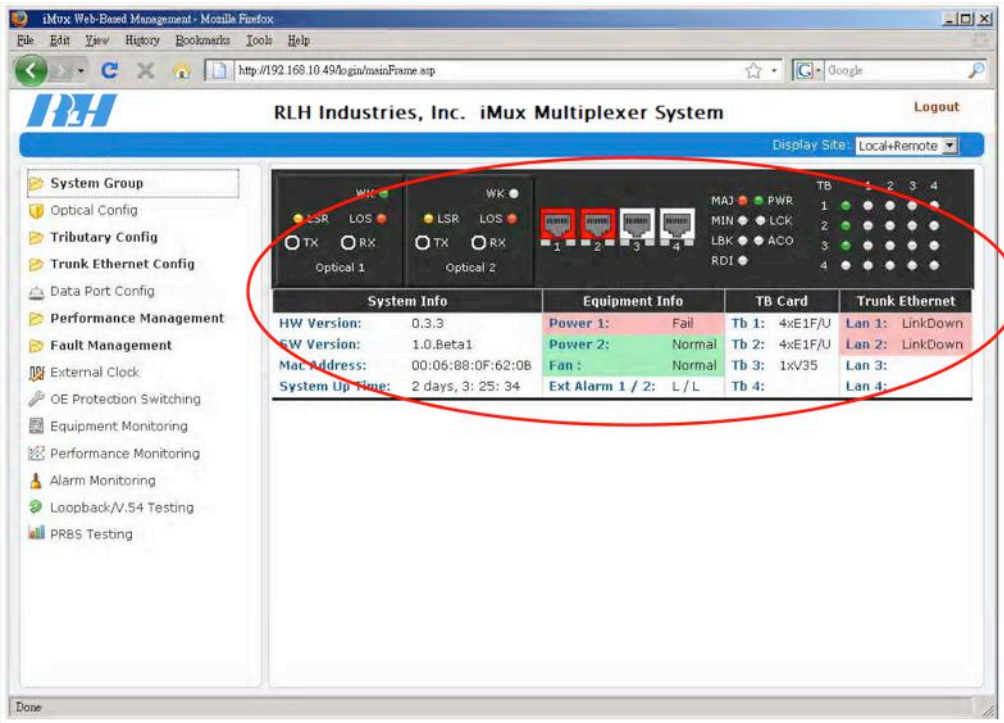
Refer to **Device Networking Configuration** for IP set up information.



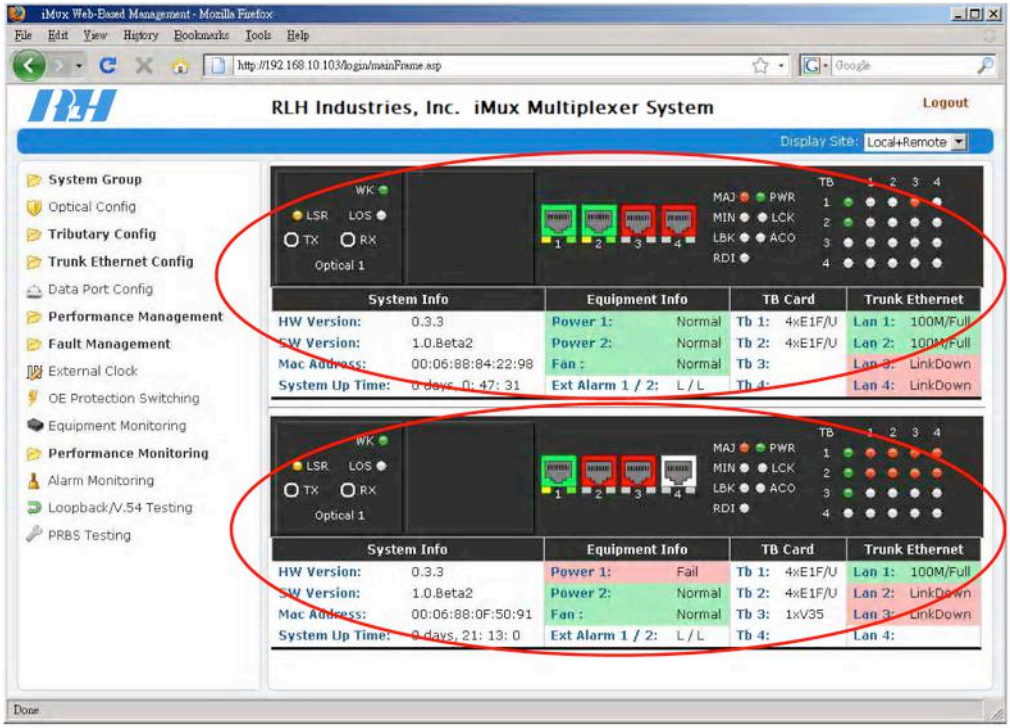
Web Interface Login Screen

The default user Name is **admin** and the password is **1234**. Refer to **User Account Management** for user name and password information.

After login, the equipment status screen is shown. You can display the Local site, Remote site, or Local+Remote.



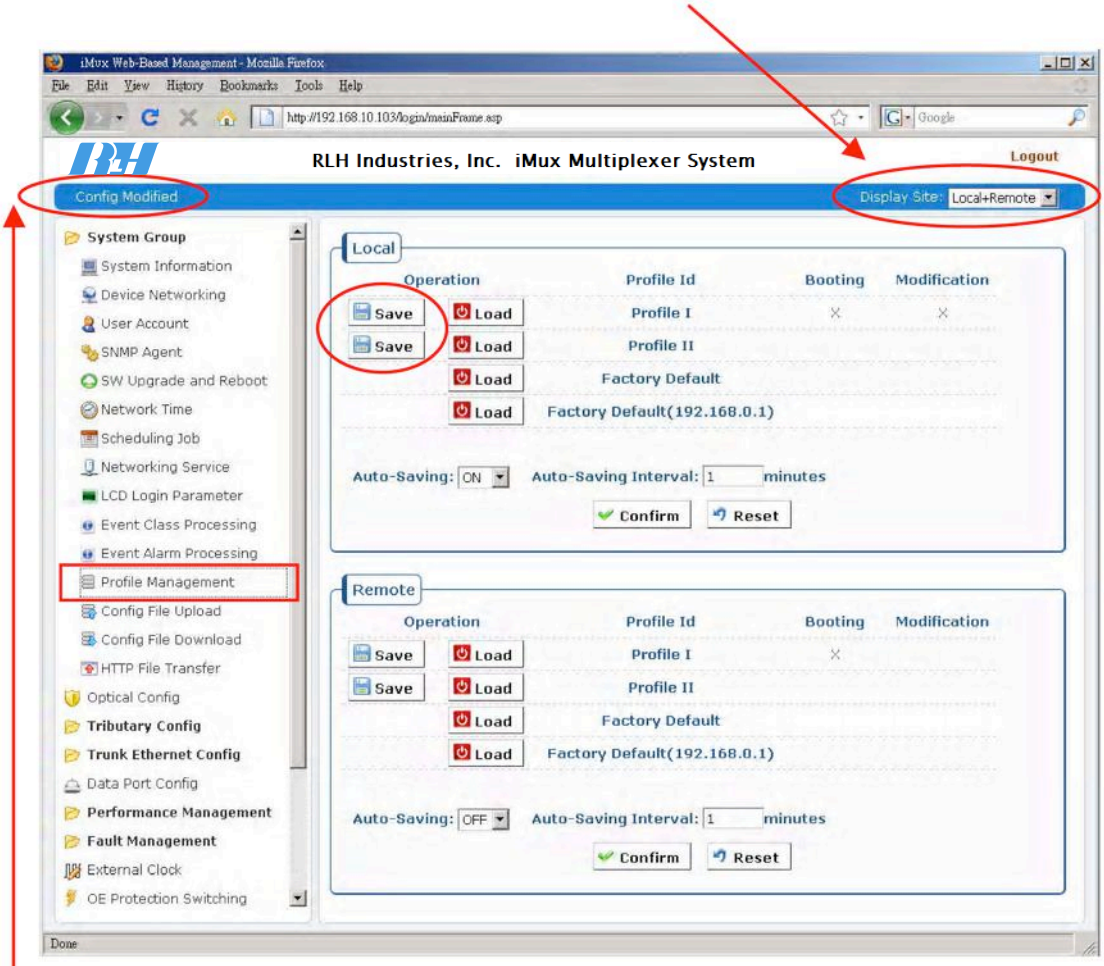
Only local side displayed



Local and remote side displayed

Saving or loading profiles

Use the pull-down menu to display the **Local** side, **Remote** side, or **Local+Remote**.



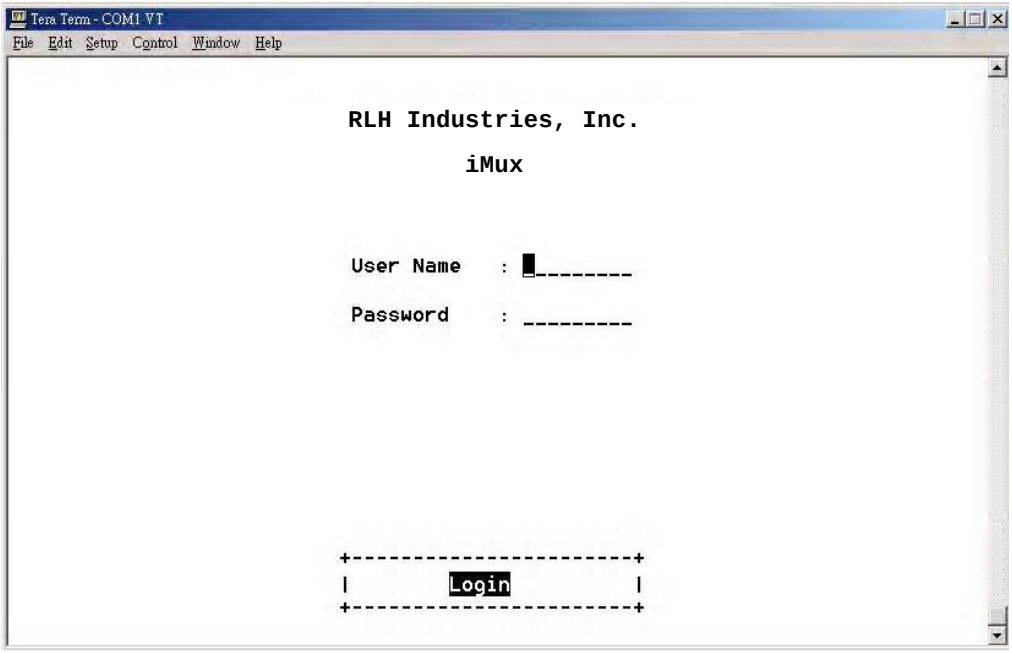
If the profile had been changed earlier, during the configuration processing, the title in the blue header bar will show **Config Modified**.

After making any changes, select **Profile Management** to save changes in **Profile I** or **Profile II**.

8. Telnet Operating Interface

SNMP management

Use the RJ-45 port to connect to the SNMP management system. To be able to use the telnet interface, the device IP must be configured first.



SNMP Login Screen

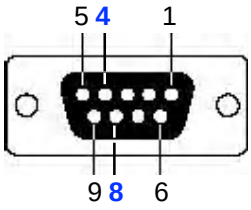
Refer to **Device Networking Configuration** for IP set up information.

The default user Name is **admin** and the password is **1234**. Refer to **User Account Management** for user name and password information.

9. Appendix

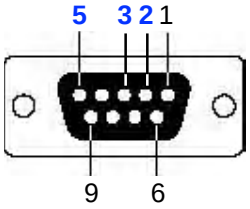
Craft & External Alarm Ports Pin Assignment

External clock port



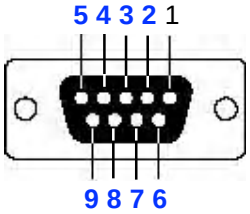
Pin 4 and Pin 8 of DB9 are used for E1 PCM data or TTL Clock input.

Craft port (VT100)



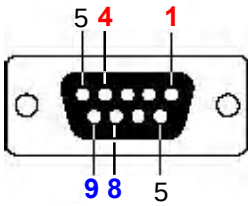
Pin No.	Signal
2	TxD
3	RxD
5	GND

Alarm port



Pin No.	Signal
1	-
2	RMIN LEDA
3	RMIN BUA
4	RMAJ LEDA
5	RMAJ BUA
6	RMIN LEDB
7	RMIN BUB
8	RMAJ LEDB
9	RMAJ BUB

External alarm port



	Pin No.	Signal
Port 1	1	Positive Input
	8	Negative Input
Port 2	4	Positive Input
	9	Negative Input

The voltage offset between positive and negative input: 3 ~ 60VDC. Input current range: 0.5 ~ 8 mA

10. Troubleshooting

First Step: Isolate the problem

Following the the installation procedure will greatly speed any troubleshooting. It is designed to isolate different parts of the system during installation.

Isolating the source of trouble is essential to determining the steps needed to fix the problem. Most installation problems can be easily fixed in the field once the problem is properly identified.

Common Issues

Most problems encountered during installation and testing can be attributed to these 4 issues:

- **Problems with the incoming signal**
- **Problems providing correct power to the system**
- **Problems with the copper connections wiring due to nicking, scoring or poor terminating**
- **Problems with the fiber optic cable**
- **Problems with missing or improperly installed modules**
- **Problems with configuration**

RLH iMux systems are built to the highest standards and fully tested before leaving the factory.

Isolating and ruling out common issues with the installation will help determine if there is a problem with the unit itself.

Power supply issues

PWR LED remains off

The iMux system isn't receiving proper power.

AC power

- Check AC power using a multimeter.

DC power

- Check power at the DC terminals using a multimeter.
- No AC power can be detectable on the DC power line.
- Check wiring for nicking, scoring or poor termination.

Verifying fiber cable

Verify the fiber cable when incoming signal is good, but the other end indicates that a fiber signal is not being received. To test the fiber cable, use a fiber optic cable test set with light source and meter.

iMux System Fiber Test Specifications

Fiber Type	Wavelength	Attenuation	Maximum Distance
Multimode	850nm	10dB max.	1.5 miles (2.5km)
Single-mode	1310nm	8dB max.	9 miles (15km)
Single-mode	1310nm	8dB required min. loss	37 miles (60km)

When reconnecting fiber cables, check the correct connection of the fiber cable.

Module installation

The iMux comes standard with modules pre-installed and pre-configured. When replacing or installing any modules, use caution to ensure that

- **The modules are fully inserted without damaging any components on the circuit board**
- **The locking screws are completely seated and hand tightened only**
- **The breakout adapter cables (where used) are properly connected and seated**
- **The optical modules are protected at all times with dust cap or fiber connector installed**
- **Special handling requirements are observed**

If the iMux module configuration is changed, or modules are moved to a different tributary slot, the system must be reconfigured accordingly using the VT100 management interface.

Troubleshooting Guide

No.	Symptom	Probable Cause	Corrective Action
1	VT-100 cannot login	• CIT cable connection invalid. • Baud Rate incorrect and com port incorrectly selected. • Input wrong account and password	• Check cable link • Check baud rate and com port • Check login name and password
2	The equipment screen alarm indicators are different from physical indicators.	• Alarm configurations incorrectly set. • Physical alarm connector faulty.	• Check Tributary Slot parameters and Ethernet parameters configuration screen. • Check service mode • Check Ethernet port contacts • Check Ethernet cable • Check duplex matching • Disable unused ports
3	Ethernet has serious packet loss.	• RJ45 connector is damaged. • FUUL/HALF duplex does not Trunk Ethernet port service.	• Check the duplex matching. • Check the auto-neg mode. • Check data forwarding mode. • Check all Trunk Ethernet port configuration functions.
4	Ping fails, can't transfer data, or can't remote Telnet.	• Trunk Ethernet port service is off. • fiber cable failure. • RJ45 connector is damaged. • Networking service management telnet function is off. • Trunk Ethernet general parameters setting error.	• Check duplex matching. • Check all Trunk Ethernet port configuration functions. • Check the fiber contacts. • Test and/or change optical cable • Check networking service management function and preform loopback test. • Execute Autoblk to check optical connection.
5	The unit is reset or powered off, all the configuration settings are lost.	• User did not save configuration. • Incorrect loading profile was selected during last startup.	• The iMux will startup according to the last startup profile loaded. • Select the correct startup profile on startup. • If you loaded the factory default profile during you last startup, the iMux will default to the factory setting upon restart.
6	The iMux cannot be managed	• Networking service management SNMP function is turned off. • Device IP is incorrect. • SNMP agent configuration read/write community is incorrect.	• Check networking service management. • Check device IP. • Check SNMP agent configuration.
7	Power indicator is off	• Power supply is not available. • The power supply switch is not turned on. • the power supply connections are loose or faulty.	• Change the power supply. • Turn on the iMux power switch. • Check all power connections.

No.	Symptom	Probable Cause	Corrective Action
8	Optical LOS alarm is on.	• If the self loop of the optical ports is normal, and the connection of the optical cables is correct, the fiber cables are faulty or the distance is too long. • The TX and RX optical cable connections are reversed.	• Test and/or change the optical cables • Change to a long distance optical module. • Exchange the TX and RX fiber cables.
9	The equipment of one side of the optical connection is normal, and the other has a LOS alarm.	• The fiber optic cable is faulty. • The optical module has malfunctioned.	• Test and/or change the optical cables. • Self loop the equipment that has the LOS alarm to test the optical module. • Contact your support representative.
10	E1 interface alarms.	• Coaxial connector is faulty. • The E1 equipment is powered off. • The E1 TX and RX interface connection is reversed. • The alarm of the E1 tributary slot is not masked.	• Replace the coaxial connector. • Verify functioning E1 signals to the iMux. • Check the E1 TX and RX connections. • PRess the MASK button mask the E1 tributary alarm.
11	V.35 interface alarms.	• Clock settings do not match. • The V.35 connector is bad.	• Check the V.35 interface configuration. • Check the V.35 connector and wiring.
12	OE module isn't switching.	• OE startup lock function is set incorrectly.	• Check optical interface parameters configuration. • Check OE switching protection status.
13	PRBS test showing bit errors, or test is OK but always showing red indicators.	• Non-compliant use of framing in unframed type. • The user lookup PRBS test result is in the wrong place.	• Configure the correct type in unframed. • Generally, the user should check the results in the PRBS testing screen.
14	Cannot login using front panel LCD controls.	• Input key sequence is incorrect. • The LCD Login Configuration has been redefined.	• Check LCD Login Configurations.
15	E1 interfaces have bit errors.	• Impedance is not matched. • E1 cables exceed length limits. • E1 connector are faulty. • 120Ω connection cables are not twisted. • The E1 terminal unit does not share a common ground with the iMux.	• Verify the impedance of the E1 equipment is the same as the iMux module. • Confirm that the E1 cable is no longer than 200 meters. • replace the E1 connectors. • Check the 120Ω RJ45 connector that pins 1 & 2 are twisted, and pins 3 & 4 are twisted. • Confirm that the E1 terminal unit and the iMux are properly grounded in accordance with proper electrical standards.

11. Specifications

General Specifications

Alarm	Contact Capacity	4 relay contacts (DB-9 connector)
	External Alarm	DB-9 connector
Power Supply	AC	115/240V (90~240V) (47Hz~63Hz)
	DC	48V (36~75V)
	Power consumption	30W maximum
Environment	Working Temp.	0℃ ~ +50℃ (32℉ ~ 122℉)
	Working Humidity	5% ~ 95% RH non-condensing
	Storage Temp., Humidity	-20℃ ~ 60℃ (-4℉ ~ 140℉), 5% ~ 95% RH
Other	EMI	Comply with CISPR 22 class A (EN55022), FCC part 15 class A subpart B
	MTBF	48,000 hours minimum
	Dimensions	W 17.3" x D 11.2" x H 1.75" (440 x 285 x 44.5mm)

Optical Module Specifications

Optical Interface Module	Optical Source	MLM 850/1310/1550nm				
	System Gain	19~30dB				
	Data Rate	155 Mb/s				
Fiber connector	100BaseFX ports, ST, SC or FC connectors, single or multi mode					
	Dual fiber or single fiber (bi-directional) connectors (multimode single fiber is SC only)					
Fiber Type	Multimode	50 /125μm, 62.5/125μm				
	Single mode	9/125μm				
Dual Fiber Optics	Fiber Type	Multimode		Single-mode		
	Wavelength TX/RX (nm)	1310	850	1310~1550	1310~1550	1310~1550
	Distance	2km / 1.2mi.	2km / 1.2mi.	20km / 12mi.	60km / 36mi.	120km / 74mi.
	Min. TX PWR (dBm)	-18	-15	-15	-6	0
	Max. TX PWR (dBm)	-10	-5	-8	-3	+5
	RX Sensitivity (dBm)	-31	-27	-34	-34	-34
	Link Loss Budget (dB)	13	10	19	28	34
Single Fiber Optics (Bi-directional)	Fiber Type	Multimode		Single-mode		
	Wavelength TX/RX (nm)	1310/1550		1310/1550	1310/1550	1310/1550
		1550/1310		1550/1310	1550/1310	1550/1310
	Distance	2km / 1.2mi.		20km / 12mi.	40km / 25mi.	60km / 36mi.
	Min. TX PWR (dBm)	-18		-10	-5	-3
	Max. TX PWR (dBm)	-8		-3	0	+2
	RX Sensitivity (dBm)	-38		-38	-38	-38
	Link Loss Budget (dB)	20		28	33	35

Service Module Specifications

T1 Interface Module	Channel Capacity	4 x T1
	Bit Rate	1.544 Mbs
	Line Code	B8ZS per ANSI T1.408 and AMI
	Line Framing	Extended superframe format (ESF 24-Frame multiframe) per ANSI T1.408
	Input Jitter Tolerance	Per AT&T TR 62411
	Output Jitter Tolerance	Per AT&T TR 62411
	Line impedance	120Ω Balanced
10/100M Ethernet Interface	Compliance	IEEE 802.3/802.3u
	Configuration modes	10/100M, full/half-duplex, auto-negotiation and auto MDI/MDIX
	Maximum packet length	1536/1522 Bytes
	Frame buffer	329 frames, IEEE 802.3X standard
	MAC Table	1024-entry MAC address mapping table
	VLAN/QOS function	Supported
	Port Rate Control	Supported
	Connector	RJ-45
	Ports	4 Ethernet
RS232 Module (DCE)	Channel Capacity	4 x RS232
	Bit Rate	115200 bps
		TXD/RXD 1.536Mbit/s
		DTR/DSR 128Kbit/s
		RTS/CTS 128Kbit/s
		DCD/RI 64Kbit/s
	Local loopback	Supported
	Remote loopback	Supported
2/4W Data/SCADA Module	Channel capacity	4 x Analog 2 wire or 4 wire data/SCADA
	Connector	4 x RJ-11
	Bandwidth	300Hz ~ 3.4KHz
	Impedance	600Ohm
	Longitudinal Conversion Loss	>60dB
	Return Loss	>30dB
	Idle Channel noise	75dB
	CMRR	>60dB

12. Ordering Information

Base Systems

Part Number	Description	Power 1	Power 2	Dimensions (1RU)
RLH-IMUX-V-2	iMUX BASE SYSTEM DUAL 48 VDC INPUT PWR	48VDC	48VDC	W17.3in x D11.2in x H1.75in (440mm x 285mm x 44.5mm)
RLH-IMUX-A-2	iMUX BASE SYSTEM AC/DC & 48VDC INPUT PWR	115/220VAC	48VDC	W17.3in x D11.2in x H1.75in (440mm x 285mm x 44.5mm)

- Optics and Service Modules are ordered separately and are pre-installed.
- System is pre-configured before shipping for quick and easy operation.
- 2 multiplexers are required for a complete system.
- Bidirectional single fiber models require an A side unit and a B side unit for a complete system.
- Please contact your RLH sales representative for pricing and delivery information.

Port Modules

Part Number	Description
RLH-MM-T1	T-1 4X1 MODULE
RLH-MM-D1	R-232 4X1 MODULE
RLH-MM-AO	2 WIRE (POTS) FXO/CO 4X1 MODULE
RLH-MM-AS	2 WIRE (POTS) FXS/SUB 4X1 MODULE
RLH-MM-D2	2/4 WIRE ANALOG DATA/AUDIO/SCADA 4X1 MODULE

- Service Modules are ordered at same time as base system and are pre-installed.
- System is pre-configured before shipping for quick and easy operation.
- Please contact your RLH sales representative for pricing and delivery information.

Optical Modules

Part Number	Description	Side	Distance	Fiber	Part Number
Multimode ST	iMux Optical Module	-	2 km/1.2 mi	62.5 µm	**RLH-OM-04-1**
Bi-Directional Single-mode SC	iMux Optical Module	A	20km/12.4mi.	8~9 µm	**RLH-OM-10-1**
	iMux Optical Module	B	20km/12.4mi.	8~9 µm	**RLH-OM-11-1**
	iMux Optical Module	A	60km / 37mi.	8~9 µm	**RLH-OM-14-1**
	iMux Optical Module	B	60km / 37mi.	8~9 µm	**RLH-OM-15-1**
Single-mode SC	iMux Optical Module	-	20km/12.4mi.	8~9 µm	**RLH-OM-40-1**
	iMux Optical Module	-	60km / 37mi.	8~9 µm	**RLH-OM-41-1**
	iMux Optical Module	-	120km / 74 mi.	8~9 µm	**RLH-OM-42-1**
Single-mode ST	iMux Optical Module	-	20km/12.4mi.	8~9 µm	**RLH-OM-50-1**

- Optics Modules ordered at same time as base system and are pre-installed.
- System is pre-configured before shipping for quick and easy operation.
- Bidirectional single fiber models require an A side unit and a B side unit for a complete system
- Please contact your RLH sales representative for pricing and delivery information

13. Support

Technical Support

Email:	support@fiberopticlink.com
24/7 technical support:	Toll Free 1-855-RLH-24X7 Toll Free 1-855-754-2497

Contact Information

Corporate Headquarters:	RLH Industries, Inc. 936 N. Main Street Orange, CA 92867 USA
Phone:	(714) 532-1672 Toll Free 1-800-877-1672 Toll Free 1-866-DO-FIBER
Fax:	(714) 532-1885
Email:	info@fiberopticlink.com
Web site:	www.fiberopticlink.com

RLH Industries, Inc.
936 N. Main Street, Orange, CA 92867 USA
T: (714) 532-1672
F: (714) 532-1885

Please contact your RLH sales representative for pricing and delivery information.

Specifications subject to change without notice.